





















*The*  
***Kentucky Geological***  
***Survey***

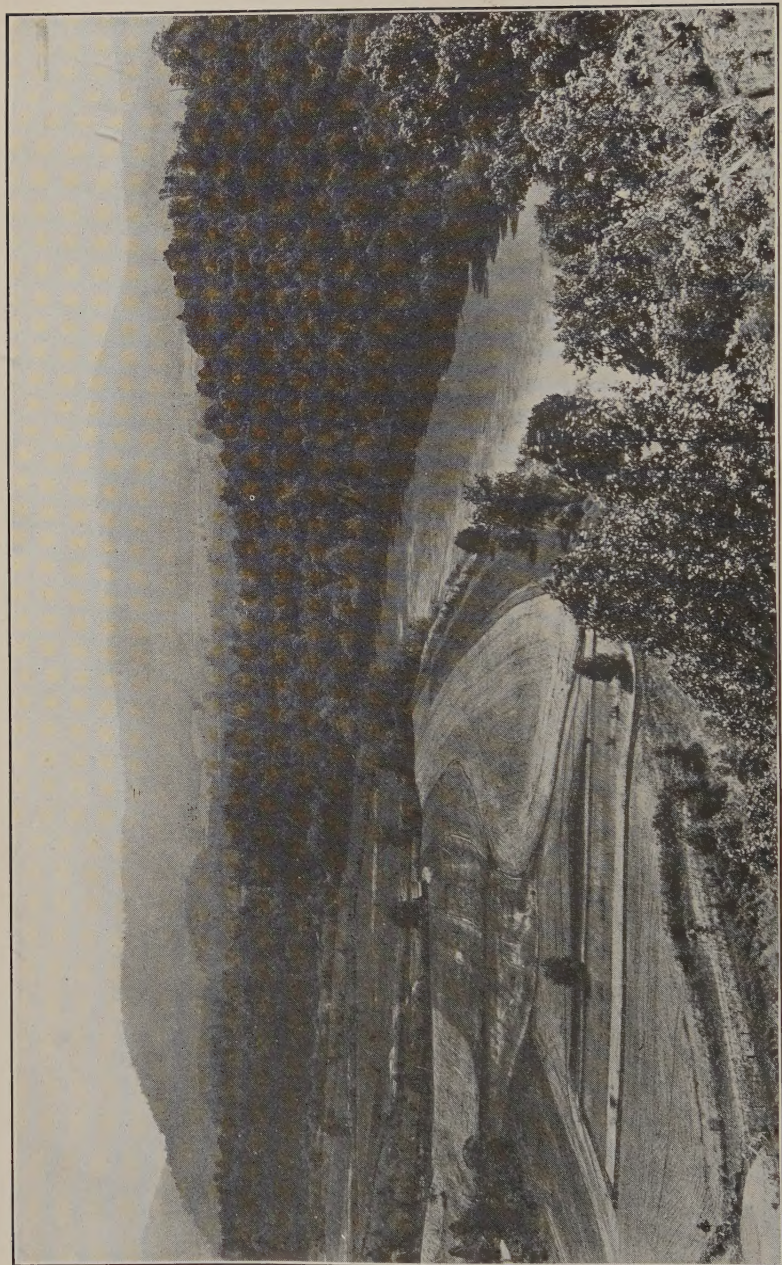
WILLARD ROUSE JILLSON  
DIRECTOR and STATE GEOLOGIST



SERIES SIX  
VOLUME TWELVE

*New Oil Pools*  
*of Kentucky*

1926



NICHOLSON BEND, CUMBERLAND RIVER

The Cumberland River swings sharply to the south two miles below Williamsburg, Whitley County, Kentucky, in the Brown's Creek Syncline. (See page 76.)

# NEW OIL POOLS *of* KENTUCKY

An Indexed Collection of Twelve Separate Papers On Oil and  
Gas, Kentucky's Mineral Resources, Progress of Topo-  
graphic Mapping and Geological Survey  
Administration in 1922 and 1923.



BY  
WILLARD ROUSE JILLSON  
DIRECTOR AND STATE GEOLOGIST  
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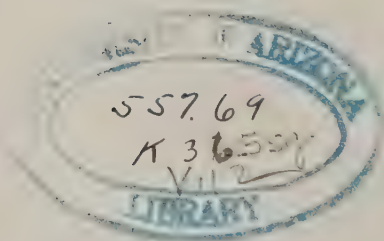
*Illustrated with 103 Photographs,  
Maps and Diagrams*

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THE KENTUCKY GEOLOGICAL SURVEY  
FRANKFORT, KENTUCKY  
1926

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## *Preface*

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Oil and gas development, including production, reached its peak in the State of Kentucky during the year 1919 with the outline of the Lee, Johnson, Magoffin, Lawrence and Warren County pools. Since that time the history of the industry shows in the main the progressive drilling up of offset locations in these and other districts in the State combined with a persistent attempt in the way of exploration in a number of widely separated localities.

The principal result of this exploration has been the discovery of several new oil and gas pools broadly distributed throughout the State. While none of these pools give indication of a greater importance than that of the Big Sinking Pool in Lee County, they are each and all of them of much economic importance in their respective localities and to the State as a whole.

During the past several years the writer in the course of his official duties has secured, personally, in the field and presents herewith geological and other information pertinent to the most important of these newer oil and gas fields. This volume is, therefore, composed of a group of separate reports distinct in origin and presentation. Most of the field and office work on these manuscripts was done from 1921 to 1923. Delay in printing because of lack of departmental funds made revisions necessary in 1925, thus bringing the volume up-to-date. It is hoped that those interested in the development of oil and gas in Kentucky will find information within these covers of practical benefit in pursuing their separate investigations.

*Old State Capitol  
Frankfort, Ky.  
Dec. 1, 1925.*

*M. R. Gillson*

*State Geologist of Kentucky.*

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NEW OIL POOLS  
*of* KENTUCKY



## I.

### GEOLOGY OF THE PELLVILLE OIL POOL

#### INTRODUCTION

The Pellville oil pool is located in Northwestern Kentucky near the Ohio river where Ohio, Daviess and Hancock Counties corner. It is 65 miles southwest of Louisville in an air line and about 19 miles by auto road slightly southeast of Owensboro. Cloverport and Hawesville, small Ohio river towns on the Louisville, Henderson and St. Louis railroad, are respectively 10 and 12 miles northeast of Pellville, while Whitesville, a small town on the Owensboro branch of the Illinois Central railroad, is only about five miles distant to the southwest. The town of Pellville is located on the old Hardinsburg-Owensboro road, which passes through Knoxville and Patesville.

The field work upon which this report is based was done by the writer in the early spring of 1923 and the fall of 1925. Acknowledgment is made of additional field data, including map supplied by J. S. Hudnall, the Petroleum Exploration Co., the New Domain Oil and Gas Co., and the Leeper Oil Co.

#### TOPOGRAPHY AND DRAINAGE

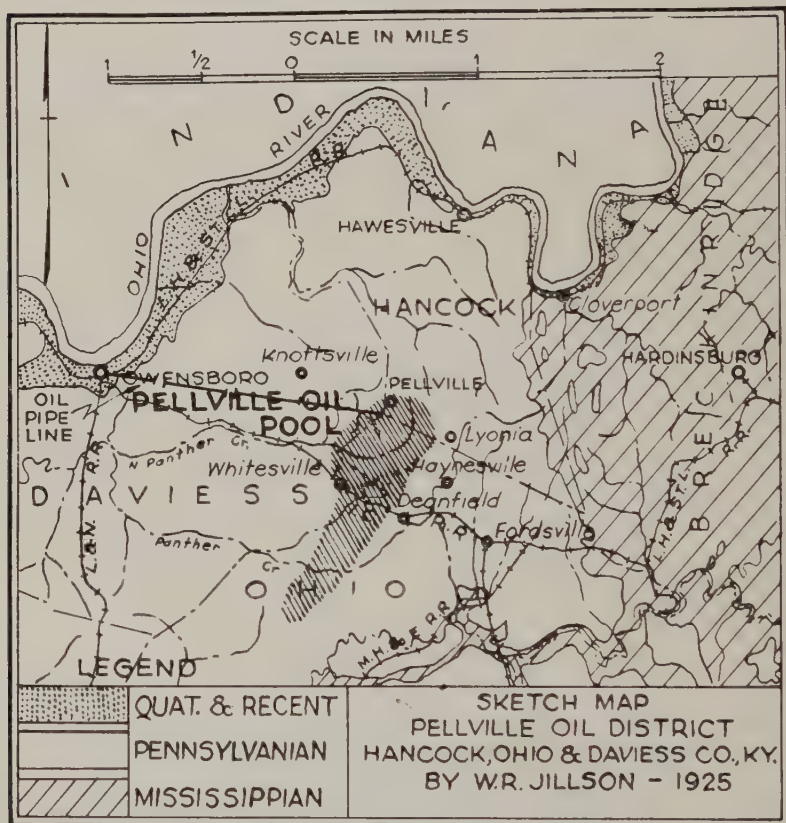
Pellville is situated on the divide between the waters of Horse Fork of Blackford Creek and the North Fork of Panther Creek, both tributaries of the Ohio river. Its elevation as at-



TYPICAL HANCOCK COUNTY TOPOGRAPHY

This view shows the Pyles and Harkles Co. operation on the G. L. Morrison lease with 3 wells pumping about 15 barrels per day.

tested by a U. S. Geological Survey bench mark situated in the town is 531 feet above sea level. The region is one of the low, rolling hills with little level land either in the bottoms or on the ridges. Physiographically it is a part of a very low maturely



dissected northwest dipping plateau. The highest elevations in the region range up to almost 650 feet near St. Thomas' church, three miles southeast of Pellville in Hancock County. Minimum elevations nearby in Panther Creek and Horse Fork Creek bottoms are about 440 feet. The local relief for any particular part of the field, however, is usually not more than 100 feet.

#### STRATIGRAPHY—SURFACE ROCKS

Only rocks of the lower coal measures are exposed in the Pellville district. These consist of an alternating series of sand-



stones, sandy shales, shales and coals all of Pottsville (Pennsylvanian) age. The uppermost beds of Chester (Mississippian) age are about 175 or 200 feet below the surface in this vicinity, but may be seen on outcrop in the eastern part of Hancock County. The Hawesville coal described originally by Dr. David



#### UPLAND TOPOGRAPHY OHIO COUNTY

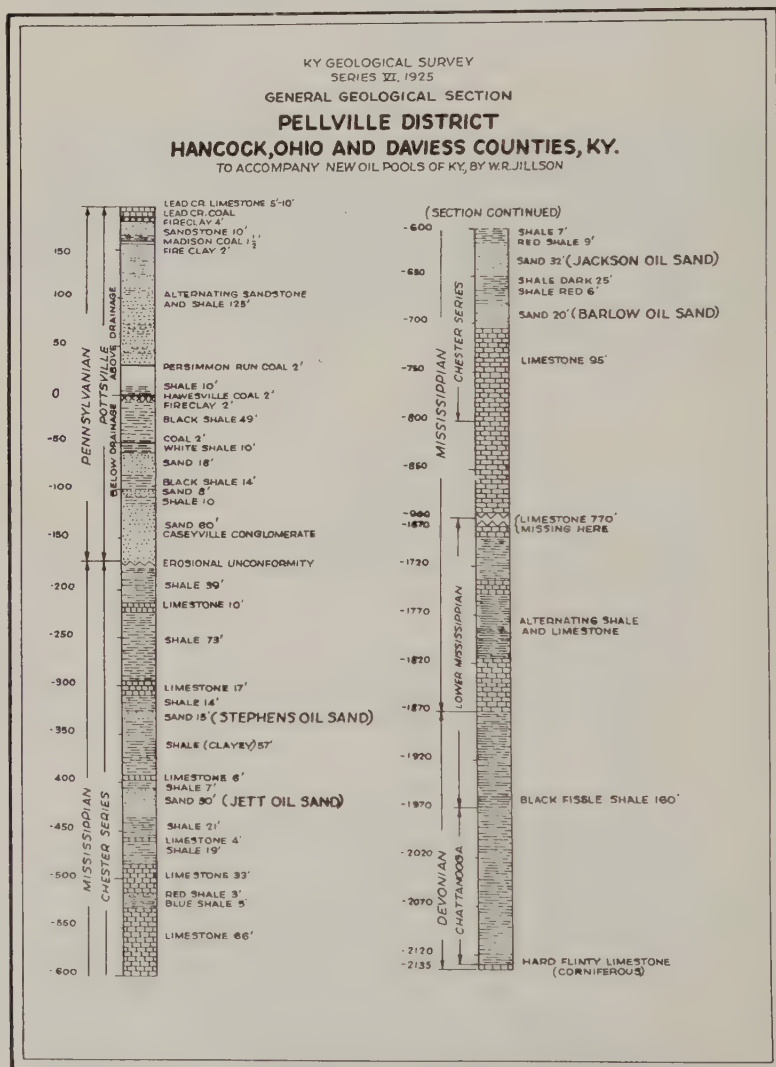
The power house on the Robert Miller lease is shown located on the ridge in the middle background.

Dale Owen and later by P. N. Moore and A. F. Crider is exposed in the hills about Lyonia, Hancock County, but drops under drainage at Pellville, where superimposed micaceous sandstones and dark argillaceous shales are found at the surface. Of the two sandstones exposed in this locality, the lowermost a rather coarse elastic, seems to be very persistent, and the base of it might afford a fairly dependable key bed for local surface structure. A generalized geological section attached to this report gives the Pennsylvanian rocks in more detailed sequence.

#### STRATIGRAPHY—SUBSURFACE BEDS

The unexposed rocks in the vicinity of Pellville down to a depth of 2,500 feet consist of Paleozoic sandstones, shales, sandy conglomerates, limestones and some thin coals, cannel and bituminous. Sediments of Pennsylvanian, Mississippian, Devonian, Silurian and Ordovician age are represented in this section. Immediately beneath the surface and to a depth of 175-200 feet are found the basal beds of the coal measures. The lowest and most pronounced formation in this group is the Caseyville sandy conglomerate, so well shown on outcrop in eastern Hancock County where it rises as a rather formidable escarpment 50 to 75 feet in height.

Beneath the Caseyville, and separated from it by a pronounced unconformity is found the Chester (upper Mississippian) group of sandstones, sandy shales, shales, and limestones



about 850 feet in thickness. In descending order this group is composed of (1) the Buffalo Wallow shale and limestone, (2) the Tar Springs sandstone, (3) the Glen Dean limestone, (4) the

Hardinsburg sandstone, (5) the Golconda limestone, (6) the Cypress sandstone, (7) the Gasper oolitic limestone, (8) the Sample sandstone, and (9) the Ste. Genevieve limestone. Subjacent to these bed rocks of Meramec (middle Mississippian) age the represented by the St. Louis cherty limestone and the Warsaw formation consisting of shaly limestones and calcareous sandy shales about 450 feet thick. The Osage group (lower Mississippian) is composed of the Rosewood and New Providence shales within which is included several thin sandstones totaling about 400 feet in thickness.

Rocks of Devonian age underlie the Mississippian series unconformably in this section generally at a depth of about 1,850 feet. In this group there are three divisions: (1) The Chattanooga or New Albany shale (upper Devonian), (2) the Hamilton limestone and (3) the Onondaga limestone. The latter two limestones are of Middle Devonian age. The Chattanooga shale is generally about 200 feet thick and the Hamilton and Onondaga limestones underlying are taken together about 50 or 60 feet thick. The Silurian is represented by limestones and calcareous shales of Niagaran age of about 170 feet in thickness beneath which the long Calcareous series of Ordovician beds sets in and continues to undetermined depths.

The Trenton exposed on the crest of the Cincinnati Arch in Central Kentucky in the vicinity of Lexington would probably be found in the Pellville region at a depth of about 3,000 feet. The Newman well drilled five miles south of Hawesville to a depth of 2,353 feet did not penetrate it. The deep (3,145 feet) Breckinridge Cannel Coal Co. well drilled at Victoria, in southeastern Hancock County, however, in 1921, was probably completed in the High Bridge series. It possibly entered the Trenton at about 2,850 feet. The record of this well was carefully kept and is regarded as a good guide to the sequence of the deep subsurface formations.

THICKNESSES OF SUB-SURFACE STRATIGRAPHIC DIVISIONS,  
PELLVILLE DISTRICT, KENTUCKY

System	Series	Formation	Thickness
Pennsylvanian	Pottsville	Caseyville	300-350
Mississippian	Chester	Buffalo Wallow Formation Tar Springs sandstone Glen Dean limestone Hardinsburg sandstone Golconda limestone Cypress sandstone Gasper limestone Sample sandstone Total .....	850
Mississippian	Meramec	St. Louis limestone } Warsaw limestone } .....	450
Mississippian	Osage	Rosewood shale ..... New Providence shale } .....	400
Devonian	Upper	Chattanooga shale .....	200
	Middle	Hamilton and Onondaga lime- stone .....	50
Silurian	Niagaran	Louisville limestone .....	170
Ordovician	Cincinnatian	Richmond ..... Maysville ..... Eden shale .....	210 230 240
	Champlanian	Cynthia ..... Lexington (Trenton) ..... High Bridge .....	80 270 .....

## OIL AND GAS SANDS

The Pellville oil pool exhibits four separate and distinct oil and gas sands. In order of superposition as penetrated by the drill these sands are known in this district as (1) the "Stephens sand," (2) the "Jett sand," (3) the "Jackson sand," and (4) the "Barlow sand." Although about 350 feet separate the surface from the "Stephens sand," within which is found the entire thickness of the Caseyville conglomerate (Penn-





CYPRESS SANDSTONE ON OUTCROP

This sandstone is massive, cross-bedded, and the lower 20 feet is asphalt impregnated as shown here on the waters of Little Meeting Creek, Grayson County, Ky. It is the "Jackson Sand" of the Pellville district.

sylvanian) a suitable reservoiring oil sand, this upper division appears to be without production.

The Stephens sand is named from the Stephens No. 1 drilled by the Four States Oil Co. This sand was found at a depth of 443 feet and was drilled into twelve feet. It has been recognized in about one-half of the wells drilled in the field. As indicated in a subsequent correlation table the Stephens sand is a correlative of the Tar Springs sandstone (Chester) and averages about 15 feet in thickness. It is an easily recognizable formation on outcrop in western Breckinridge County, where it has long been known to be bituminous. It should be more generally recognized in well records than it appears to have been.

Beneath the "Stephens sand," the "Jett sand," averaging about 20 feet in thickness is recognized in practically all of the wells. Its thickness ranges from a few feet up to 40 feet, but it has a general average of about 20 feet. This sand is correlated with the Hardinsburg sandstone (Chester) and is one of the most persistent sandstones in the upper Mississippian series. On outcrop it is usually a very massive cross-bedded sandstone, occasionally rippled marked with an inclination to be somewhat shaly in places.

A very prominent oil sand in the subsurface productive section at Pellville is known as the "Jackson," sand and is recognized in practically all wells which are drilled deep enough to penetrate it. It is shown by drillers to be from a few feet up to 47 feet in thickness, and averages about 25 feet—much thinner than the measured outcrop in the vicinity of Big Clifty, Grayson County, where the Cypress sandstone (Big Clifty) was first known. This sandstone is the most prominent siliceous unit in the Chester group. It is decidedly bituminous at many places along its outcrop and is now operated for rock asphalt at Big Clifty (Grayson County), Summit (Hardin County), Garfield (Breckinridge County) and in Logan County, Kentucky. The Cypress sandstone has produced gas in northern Logan County in the vicinity of Diamond Springs. It is an oil and gas sand of commercial importance in both southern Illinois and Indiana.

The lowest sand producing in the Pellville section is known as the "Barlow." The "Barlow" sand, a correlative of the Sample sandstone is a lens in the Chester series, and, while not as extensive as the Cypress, it covers, as evidenced by examina



tion of numerous well records in this and adjacent parts of Kentucky, a considerable area and should receive careful consideration in all drillings projected to depths greater than the Cypress. On outcrop in Breckinridge County, it is found to



A HANCOCK COUNTY DRILLING

This operation of the Illinois Oil Co. is on the Bell Asher lease at Pellville, Kentucky. Characteristic topography is shown.

be 35 feet in thickness, but these thicknesses are not recognized in the drillings in the Pellville district, where an average of those wells which have penetrated to this sand shows it to be but 14 feet in thickness. Evidently this sand is thinning rapidly in this locality as it proceeds to the west. Since this sand occurs between the two well defined beds of limestone its measurements in the drilling records should be fairly accurate.

A review of the above correlations indicates that the "Barlow" sand is the deepest proven shallow sand in this field. After it has been penetrated no other sands of possible commercial importance from an oil and gas producing standpoint may be expected until the siliceous limestones of the Keokuk and Fort Payne formations are encountered. Since no commercial production is known to occur in this field in these lower Mississippian formations, little importance is now attached to them, though at Cloverport Keokuk beds produced gas at a depth of about 870 feet. The Chattanooga (Devonian) black shale is productive of gas at Rockport and Brandenburg in Meade County, but is not considered important here. It is underlain by the Corniferous (middle Devonian). This well known Ken-

tucky oil and gas producing horizon was found in the Jackson No. 2 well at a depth of 2,140 feet. Its extreme depth here prompts the suggestion that it will probably not be of commercial importance in this section, as the Corniferous is not known



PUMPER ON ROBERT MILLER LEASE

This well near a county school is fenced in accordance with a State law. It produced about 12 barrels a day from two sands, the "Jett" at 500 feet and the "Barlow" at 750 feet.

to be productive of oil in commercial quantities at such depths anywhere in this state. The Corniferous was productive, however, at shallower depths in central Ohio county in the Hartford pool. The known shallow productive oil and gas sands of the Pellville district are correlated as follows; the Barlow being regarded as the best at the present time.

CORRELATIONS OF PROVEN OIL AND GAS SANDS,  
PELLVILLE DISTRICT  
(In order of superposition)

Oil Sand	Avg. Thickness	CHESTER	Stratigraphic Name
1. "Stephens" sand .....	15 feet		Tar Springs Sandstone
2. "Jett" sand .....	20 feet		Hardinsburg Sandstone
3. "Jackson" sand .....	25 feet		Cypress Sandstone
4. "Barlow" sand .....	14 feet		Sample Sandstone

A number of records of wells drilled in the Pellville district have been examined by J. S. Hudnall, who has selected 17 as representative of the best records now available in the field. These have been compiled into a table to show the depths at which several sands have been encountered. This tabulation, followed by a few selected well logs, is presented herewith:

TABULATION OF OIL AND GAS RECORDS, PELLVILLE OIL DISTRICT, KENTUCKY

Name of Well	Elev.	Total Depth	Remarks	Stephens No. 1 (Tar Spring)	Jett No. 2 (Hardinsburg)	Jackson No. 3 (Cypress)	Barlow No. 4 (Sample)
Higdon	465	771	Good log		499-501	711-706	759-771 Oil
Stephens	568	455	Poor and inaccurate log	443-455 Oil			
Garrett	488	707	Good log		430-450 Oil	630-662	688-707
Stewart No. 1 by Gibson	537	482	Good log	370-424 Gas	Oil and Gas 442-482		
Stewart No. 1, Ky. Oil Co.	542	686	Good log	371-380 Oil and gas	Oil and gas 456-480	670-686 (Saltwater) (686)	
Stewart No. 2 Ky. Oil Co.	524	469	Good log	Show of oil and gas 360-363	Oil 433-467		
Stewart No. 3 Ky. Oil Co.	528	482½	Good log	360-380 Gas	Oil 441-482		
Barker	540?		Being drilled				
Jett No. 1	560	483	Fair log		464-483 Oil and gas		

TABULATION OF OIL AND GAS RECORDS, PELLVILLE OIL DISTRICT, KENTUCKY—Continued.

Name of Well	Elev.	Total Depth	Remarks	Stephens No. 1 (Tar Springs)	Jett No. 2 (Hardinsburg)	Jackson No. 3 (Cypress)	Barlow No. 4 (Sample)
Jett No. 2	557	770	Good log	382-386 Gas	Show of oil 470-480	Gas and show of oil 666-685	730-740 Show of oil
Barlow No. 1	547	748	Fair log			667-687?	726-748 Oil
Rowland No. 1	525	713	Good log	393-401 Gas	438-458	(Saltwater) 639-665	696-710 Oil
Jackson No. 1	462	619	Poor log		387-395	607-619 Oil	
Jackson No. 2	462	2405	Fair log		Show of oil 385-392	607-619 Oil	Saltwater 680-690
Arrington	510	726	Good log	375	447-451	584-631 Gas	Saltwater 726 661-670
Ray No. 1	550?	548	Depth to sand approximate		364-378	Saltwater 540 527-548 gas	
Tally No. 1	490?	502			310-320	467-502 (Oil and gas) Saltwater at 502	

## ANALYSES.

G—4164. Petroleum labeled "Pat Stevens' farm in Hancock Co., near Pellville." Wells 5, 6, 7, 8, 9, 10. Wells from 500 to 700 ft. deep. Drilled by Bert Thomson, Pellville, Ky., in 1924. Collected by W. H. Lambeth.

Samples received July 5, 1924. A thin, dark brown oil. Specific gravity 0.8445, at 60 F, or 35.8 Beaume.

## Analysis

Distillate below 150°C (302°F)	18.9%	Gasoline fraction
Distillate 150-300°C (302-572°F)	31.0%	Burning oil fraction
Thick, brown tar	49.7%	
Loss in analysis	0.4%	

---

100.0

Began to distil at 60°C (140°F)

(Analysis by A. M. Peter)

July 7, 1924.

A. M. Peter, Chief Chemist.

G—4165. Petroleum labeled "Oil" found on W. L. Ashland's farm, John Brown's farm, Pellville, Ky.

Wells are between 500 and 700 ft. deep. From wells 1, 2 and 3. Drilled in 1924, by Bert Thompson, contractor, Pellville, Ky."

Sample a thick, dark brown oil. Specific gravity .8748, or 30° Beaume.

## Volume per cent

Distillate below 150°C (302°F)	8.1	Gasoline fraction
Distillate 150 to 300°C (302-572°F)	33.1	Burning oil fraction
Thick brown tar	58.8	

---

100.0

Began to distil at 100°C (212°F)

A little water present.

Analysis by A. M. Peter.

July 14, 1924.

A. M. Peter, Chief Chemist.

## Analysis.

G—4166. Petroleum labeled "W. G. Payne, Syh. Johnson, the Stewart heirs, farm near Reynolds Station, Ky. Wells from 500 to 700 ft. deep. Drilled by the Ky. Oil Co., Pellville, Ky. Wells Nos. 21, 22, 23, 24, 25, 26, 27, 28 and 29.

Sample a thick, dark brown oil. Specific gravity .8715, or 30.6° Beaume.

## Analysis.

Distillate below 150°C (302°F)	9.1 Gasoline fraction
Distillate 150 to 300°C (302-572°F)	36.3 Burning oil fraction
Thick, brown tar	54.6

---

 100.0

Began to drill at 100°C (212°F)

A little water in the sample.

Analysis by A. M. Peter.

July 14, 1924.

A. M. Peter, Chief Chemist.

## WELL RECORDS

## OHIO COUNTY

## LOG No. 1.

T. E. McQuarry No. 1, lessor. Texas and Kentucky Oil Company, lessee. Location 1 mile east of Bells Run, Ohio County, Kentucky. Authority: Hillis and Shoptaugh, driller.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil .....	10	10
Sandstone .....	10	20
Shale, sandy .....	100	120
Clay, sandy, soft, black .....	75	195
Shale, blue (cave) .....	65	255
Limestone, blue .....	5	260
Shale, blue, muddy .....	20	280
Sandstone (water) .....	5	285
Shale, blue... ..	15	300
Sandstone, coarse .....	5	305
Sandstone, water .....	25	330
Shale brown .....	5	335
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone broken .....	10	345
Limestone grey .....	25	370
Shale .....	30	400
Shale, soft, blue .....	80	480
Limestone, broken .....	15	495
Shale, soft, light .....	10	510
Shale, blue (cave) .....	140	650
Limestone white .....	10	660
Limestone grey .....	60	720
Shale, soft .....	55	775
Limestone .....	40	815
Shale .....	25	840
Sandy shale .....	5	845



Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sandstone (Jackson oil sand dry).....	25	870
Shale .....	10	880
Limestone .....	10	890
Shale .....	5	895
Limestone .....	2	897
Sandstone (Barlow sand oil show) .....		906
Shale blue .....	10	916
Limestone .....	2	918
Limestone, sandy .....	32	950
Shale .....	8	958
Limestone .....	28	986
Shale (cave) .....	22	1008
Limestone, white .....	42	1050
Total depth .....		1050

## HANCOCK COUNTY

Production: Oil and gas. Producing sands: "Pelville" and "Tar Springs" (Chester-Mississippian).

## LOG No. 2.

Breckinridge Cannel Coal Co., England, owner and operator. Location: Victoria post office. Drilled in spring of 1921. Driller, Albert MacGarvey. Stratigraphic interpretation of Prof. Arthur M. Miller, Lexington, Ky. Casing head, 550 feet, A. T. Standard rig. Casing head strata: Top of Chester.

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Surface materials .....	14	14
Shale, light colored (Buffalo Wallow) .....	5	19
Limestone, white (Buffalo Wallow) .....	6	25
Shale, gray (Buffalo Wallow) .....	8	33
Limestone, gray (Buffalo Wallow) .....	4	37
Shale, gray (Buffalo Wallow) .....	13	50
Limestone, white to gray (Buffalo Wallow) .....	32	82
Shale, mainly, light to dark (Buffalo Wallow) .....	38	120
Sandstone and dark shale (Tar Springs)....	23	143
Limestone, dark (Glen Dean) .....	1	144
Shale, calcareous (Glen Dean) .....	14	158
Limestone, dark (Glen Dean) .....	4	162
Shale, dark gray (Glen Dean) .....	1	163
Limestone, dark gray (Glen Dean) .....	5	168
Shale, dark gray (Glen Dean) .....	29	197

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, dark crystalline (Glen Dean)....	3	200
Shale, dark (Glen Dean) .....	2	202
Limestone, dark, crystalline (Glen Dean)....	15	217
Sandstone and shale (Hardingsburg) .....	11	228
Limestone, dark to light (Golconda).....	37	265
Shale (Golconda) .....	19	284
Limestone, white to gray (Golconda) .....	52	336
Shale, dark to light (Golconda) .....	22	358
Limestone, slaty (Golconda) .....	12	370
Sandstone with shale (Cypress) .....	62	432
Limestone (Gasper) .....	24	456
Sandstone, white (Gasper) .....	13	469
Limestone, white to dark (Gasper) .....	231	700
Limestone, oolitic, white (show oil), St. Gen .....	170	870
Limestone, varying in color, and of vary- ing degrees of purity (St. Louis, War- saw and Upper Waverly) .....	820	1690
Shale, greenish (New Providence) .....	30	1720

**DEVONIAN SYSTEM**

Strata	Thickness	Depth
Shale, black (Ohio-Chattanooga) .....	198	1918
Limestone, white .....	52	1970

**SILURIAN SYSTEM**

Limestone, yellow to white .....	170	2140
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**ORDOVICIAN SYSTEM**

Limestone, of varying colors and textures at bottom, compact like High Bridge limestone .....	1005	3145
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Total depth .....	8	3145
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Oil Field Stratigraphy of Kentucky, Willard Rouse Jillson, the  
Kentucky Geological Survey, Series VI, Vol. 3, pages 189, 190, 1922.



C. M. SCHULTZ LEASE, HANCOCK COUNTY

The nature of the topography, low flat hills with rather shallow drain-  
age lines, has favored the development of the Pellville district for oil and  
gas.

## HANCOCK COUNTY

## WELL LOG No. 3.

Barlow No. 1, lessor. Bert Thompson, lessee. Location:  $\frac{1}{2}$  mile southeast of Pellville, Hancock County, Ky. Type of Rig: National. Method of Drilling: cable. Kind of fuel used: Coal. Packers: Size  $6\frac{1}{4}$ . Set at 619. C. H. E 547 feet

## PENNSYLVANIAN SYSTEM

Strata	Thickness	Depth
Soil, sandstone and shale .....	452	452

## MISSISSIPPIAN SYSTEM

Limestone .....	6	458
Shale .....	4	462
Sandstone .....	1	463
Shale, black .....	137	600
Limestone, brown .....	10	610
Limestone, gray and brown .....	47	657
Shale .....	5	662
Limestone, sandy .....	5	667
Shale, sandy .....	11	678
Sandstone .....	48	726*
Sandstone (Barlow) .....	17	743**
Sandstone .....	5	748

Total depth ..... 748 feet

\*Top of pay

\*\*Bottom of pay.

Case Record: 20' 10",—260'  $8\frac{1}{4}$ ",—619'  $6\frac{1}{4}$ ". Torpedo Record: East. Torp. 60 qts. 15 ft. shell  $5\frac{1}{2}$  size. Commenced Producing: Mar. 12, 1922. L. P. Per 24 hrs. 32 bbls.

## LOG No. 4.

Amanda Stewart No. 1 (55 A tract), lessor. H. F. Gibson, lessee. Near line of Hancock and Ohio counties. (In Hancock County.) Well completed June 6, 1922.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Surface soil .....	0	10
Sandstone .....	10	32
Shale .....	32	64
Sandstone, white .....	64	75
Sandstone .....	75	105
Shale .....	105	150
Sandstone .....	150	180
Shale and Pyrites .....	180	186
Sandstone .....	186	208

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Shale .....	208	275
Sandstone .....	275	295
Shale .....	295	310
Limestone (sulphur) .....	310	315
Limestone, gray .....	315	350
Sandstone ("Stephens") gas, Tar Springs	350	424
Limestone, gray .....	424	430
Shale .....	430	442
Sandstone, hard .....	442	452
Sandstone (gas) .....	452	460
Sandstone, hard .....	460	462
Sandstone, oil ("Jett") ...	462	485
Total depth .....		485

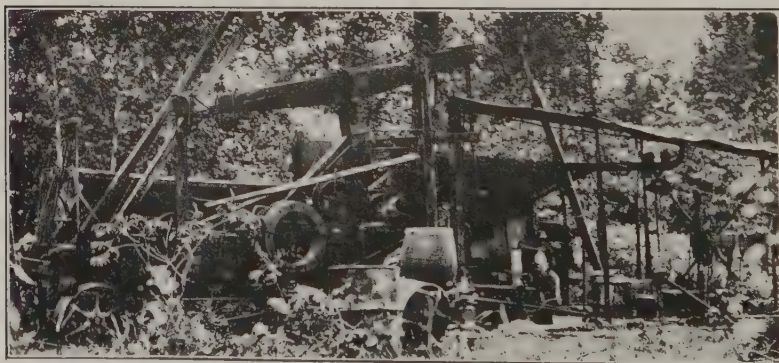
Note on Production: Natural gas measured 48,600 cu. ft. and was increased by a shot. Well filled up 200 feet at time of this shot, rising 40 feet in fifteen minutes. Estimated 5 barrels, gravity  $29\frac{1}{2}$  degrees Baume. Color, black. Gasoline rig used.

#### LOG No. 5.

Morrison No. 1 (30a), Daugherty & Shearer. Hancock County, adjoining farm to Barlow farm where first Barlow sand was found.

Elevation 502.

Jett sand.....	absent
Top of "Jackson" sand .....	623 to 653
Top of "Barlow" sand .....	689 to 712 (oil)
<hr/>	
Total depth .....	712



#### AN OHIO COUNTY DRILLING

Portable rigs are used entirely in the Pellyville district due to the shallow depth of the producing sands and the ease with which such rigs can be moved to new locations.

## LOG No. 6.

Higdon No. 1, drilled by E. M. Treat. Daviess County, about 4 miles west of Pellville.

Top of "Jett" sand .....	499-501
Top of "Jackson" sand .....	711-716 (oil)
Shale .....	716-718
Sandstone .....	718-724
Top of "Barlow" sand .....	758-770 (water)
Total depth .....	770

## OIL WELL "SAND" RECORDS

OHIO, HANCOCK AND DAVIESS COUNTIES, KENTUCKY

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
Stewart No. 3 .....	457	467	482
A. Stewart No. 1 .....	462	483	492
Rowland No. 1 .....	687	711	713
Higdon No. 1 .....	709	766	766
Garrett No. 1 .....	693	703	711
Garrett No. 1 .....	438	443	711
Morrison No. 1 .....	689	707	715
A. Stewart No. 4 .....	442	448	452
Ira Jett No. 1 .....	445	457	463
Jones No. 1 .....	615	624	685
A. Stewart No. 5 .....	712	727	725
Ira Jett No. 2 .....	451		462
Barlow No. 2 .....			713
Stewart No. 1 .....	465	478	487
Hoover No. 1 .....	680	700	705
Voyles No. 1 .....	721	741	745
Higdon No. 1 .....	772	779	784
Higdon No. 1 .....	714	726	784
Shultz No. 1 .....	668	684	688
Garrett No. 1 .....			
Hoover No. 2 .....	674	690	690
Ira Jett No. 2 .....	700	716	719
Shultz No. 8 .....	665	679	683
Hoover No. 3 .....	708	722	732
Garrett No. 1 .....	724	726	727
M. Brayer No. 1 .....	817	825	825
A. Stewart No. 2 .....	468	478	502
Barlow No. 3 .....	700	713	730
Shultz No. 3 .....	674	686	698
A. Stewart No. 3 .....	458	480	486

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
A. Stewart No. 4 .....	436	457	478
Morrison No. 2 .....	664	686	686
C. Jett No. 1 .....	466	476	484
Shultz No. 4 .....	667	681	681
Rowland No. 2 .....	725	737	739
C. T. Johnston No. 1 .....	488	504	516
A. Stewart No. 6 .....	450	482	494
C. Jett No. 3 .....	467	479	481
A Stewart No. 5 .....	422	450	470
Rowland No. 3 .....	467	476	499
Barlow No. 4 .....	721	735	747
A. Stewart No. 7 .....	463	490	503
A. Stewart No. 6 .....	416	457	464
Rowland No. 3 .....	718	728	741
D. King No. 1 .....	890	915	915
A Stewart No. 8 .....	439	459	469
A. Stewart No. 9 .....	438	467	484
L. Payne No. 1 .....	443	499	499
Stewart No. 1 .....			
Rowland No. 4 .....	731	741	745
Johnson No. 3 .....	604	615	
A. Stewart No. 10 .....	730	750	755
R. M. Miller No. 1 .....	707	723	736
L. Helm No. 1 .....	464	484	494
L. C. Voyles No. 2 .....	267	296	703
Wm. Payne No. 1 .....	733	747	757
Smith No. 1 .....	784	799	815
Morrison No. 3 .....	671	697	699
R. M. Miller No. 2 .....	426	448	473
C. T. Johnson No. 8 .....	429	453	469
Holoman No. 5 .....	469	495	500
C. A. Leeper No. 1 .....	720	734	760
R. Miller No. 8 .....	686	711	726
V. Miller No. 1 .....			
Brown No. 1 .....	549	562	565
C. T. Johnson No. 3 .....	700	718	718
Helm No. 2 .....	417	436	460
Baize No. 2 .....	668	691	702
R. Miller No. 3 .....	676	698	705
V. Miller No. 2 .....	728	746	754
Burdette No. 1 .....	749	763	775
Bailey No. 1 .....	399	437	457
Chambers No. 1 .....	675	690	705
Baize No. 2 .....	720	737	744



Names	Top	Bottom	Depth
	Sand Feet	Sand Feet	Well Feet
A. Howe No. 1 .....	715	730	740
A. Stewart No. 7 .....	404	430	466
R. Miller No. 4 .....	715	740	740
A. Howe No. 1 .....	676	694	704
V. Miller No. 3 .....	450	469	550
V. Miller No. 3 .....	715	734	745
O. Bickett .....	674	690	690
S. Flowers No. 1 .....	720	740	749
A. Stewart No. 8 .....	720	739	759
A. Stewart No. 4 .....	723	742	754
A. Howe No. 2 .....	665	681	692
V. Miller No. 5 .....	691	713	714
R. Miller No. 5 .....	706	726	726
A. Stewart No. 11 .....	407	431	438
Reardon No. 1 .....	709	726	726
A. Stewart No. 9 .....	463	497	506
J. Brown No. 2 .....	534	547	802
W. Howe No. 3 .....	696	712	712
A. Stewart No. 9 .....	456	487	489
Burdette No. 2 .....	734	747	762
H. School No. 1 .....	717	730	735
Casey No. 1 .....	461	491	492
A. Howe No. 2 .....	699	714	720
A. Howe No. 4 .....	684	700	700
Smith No. 2 .....	726	741	756
Bud Barker No. 1 .....	760	776	776
A. Stewart No. 13 .....	711	730	735
J. S. Casey No. 2 .....	430	460	467
Reardon No. 3 .....	684	702	711
V. Miller No. 6 .....			
A. Howe No. 3 .....	695	710	710
A. Stewart No. 14 .....	693	713	724
Barker No. 2 .....	733	747	747
Jett No. 2 .....	727	738	741
Reardon No. 4 .....	762	780	780
Payne No. 2 .....	702	713	725
A. Howe No. 4 .....	718	735	735
Miller No. 6 .....	460	481	497
V. Miller No. 7 .....	668	680	690
O'Neil No. 1 .....	774	790	790
Daugherty No. 1 .....	694	714	720
W. Payne No. 3 .....	701	712	726
H. Brown No. 1 .....	718	748	748
V. Miller No. 8 .....	418	440	440

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
Ed Barker No. 2 .....	747	760	762
Daugherty No. 2 .....	684	702	702
V. Miller No. 8 .....	689	711	723
A. Howe No. 5 .....	721	734	748
Bud Barker No. 2 .....	744	756	756
V. Miller No. 7 .....	730	744	755
Daugherty No. 3 .....	714	733	743
D. King No. 2 .....	615	622	976
Garrett No. 1 .....	444	458	476
A. Payne No. 1 .....	736	750	761
Collier No. 1 .....	422	437	448
A. Stewart No. 15 .....	703	721	731
Bailey No. 2 .....	420	439	449
Thompson No. 1 .....	697	723	730
G. Burdette No. 1 .....	407	426	426
R. Miller No. 9 .....	718	730	738
S. Flowers No. 2 .....	676	698	707
Helm No. 4 .....	457	487	487
Collier No. 2 .....	506	515	700
A. Stewart No. 14 .....	403	438	443
Gus Haynes No. 1 .....	785	800	802
E. Ward No. 1 .....	978	1008	1008
R. Miller No. 10 .....	729	744	760
J. Brown No. 3 .....	510	524	531
Guenther-Gant No. 1 .....	507	510	780
R. Miller No. 11 .....	739	748	758
Swope No. 1 .....	790	804	812
Bartley No. 1 .....	377	502	510
Casey No. 4 .....	432	461	465
Bartley No. 1 .....	487	502	502
R. Miller No. 1 .....	680	706	706
Casey No. 6 .....	393	439	446
Evans No. 1 .....	524	534	537
W. T. Bickett No. 1 .....	376	420	430
A. Stewart No. 16 .....	660	678	689
Bartley No. 2 .....	400	410	410
L. E. Crowe No. 1 .....	753	771	772
L. E. Crowe No. 2 .....	763	777	777
R. Miller No. 12 .....	743	762	765
Beauchamp No. 1 .....	487	501	510
L. E. Crowe No. 3 .....	490	504	510
Smith No. 4 .....	763	781	800
J. L. Brown No. 5 .....	528	542	542
Bartley No. 4 .....			

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
Phillips No. 1 .....	769	781	790
Evans No. 5 .....	520	539	539
Powers No. 1 .....	766	795	801
Collier No. 2 .....	492	501	511
Phillip No. 2 .....	603	619	620
R. Miller No. 13 .....	698	719	730
Crowe No. 4 .....	765	780	788
A. Stewart No. 17 .....	657	672	681
V. Miller No. 9 .....	665	683	686
Barlow No. 5 .....	690	710	730
Phillips No. 2 .....	781	784	784
Casey No. 7 .....	455	484	497
Smith No. 5 .....	734	750	766

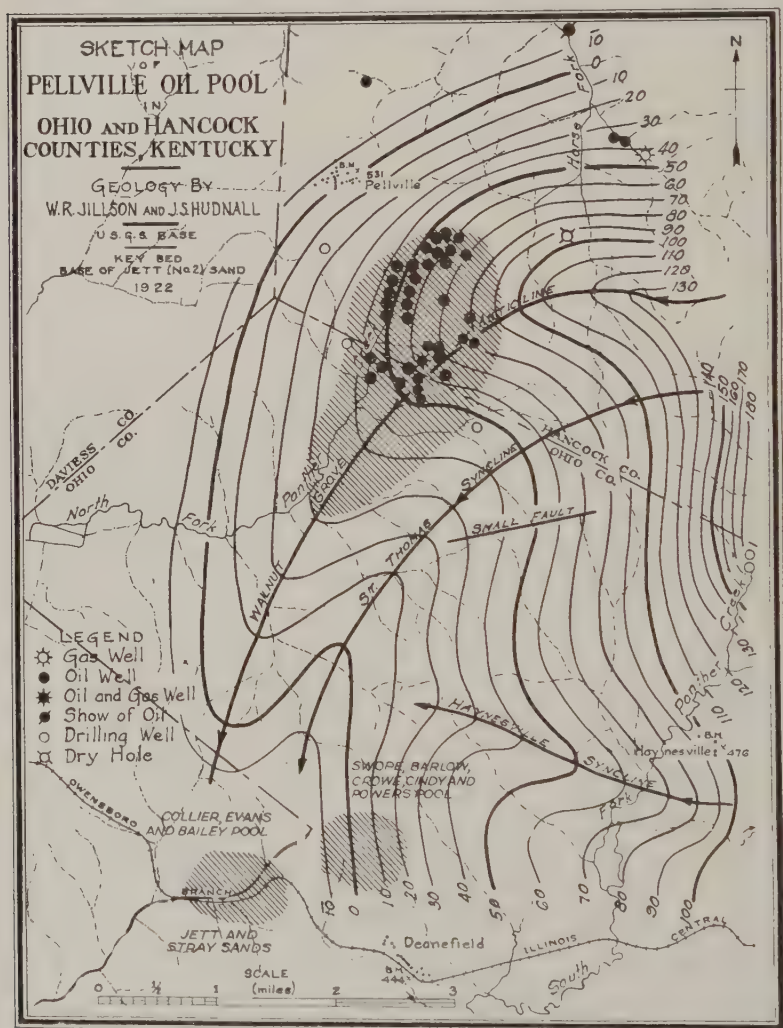
### STRUCTURAL GEOLOGY

The Western Coal Field of Kentucky is a structural basin. It is in fact the southern tip of the Eastern Interior Coal Field of Illinois and Indiana. The central part of this important coal field in Kentucky is higher than might at first glance be expected because of the occurrence of the Rough Creek disturbance, a regional uplift frequently faulted, which extends westward somewhat irregularly from the Falls of Rough Creek to Shawneetown, Illinois. Though much of the faulting along this line of disturbance is normal, considerable areas of overthrust occur, and not infrequently the pattern becomes zig-zag, due to block faulting as in central northern Webster County, where it has been detailed\* by Dr. L. C. Glenn.

The extension of the Rough Creek disturbance along a nearly east-west line in the Western Coal Field of Kentucky has produced here as in eastern Kentucky, two prominent parallel geo-synclines. The Pellville oil pool lies on the northern flank of the northern or Panther Creek geo-syncline. The lowest point structurally is in the vicinity of the mouth of Deserter Creek, Ohio County, about eleven miles southwest of Pellville. Through Deane field the rocks show a regional strike nearly north and south to north flank of the Rough Creek disturbance, which passes through the vicinity of Dundee in Ohio County, a

\*Geology of Webster County (and geological map), Ky. Geol. Survey, Series VI., Vol. V, p. 129, 1922.

point about 14 miles slightly southeast of Pellville. The relative position of the major structural features of this region with respect to the Pellville oil district may be seen in the accompanying sketch map of Hancock and Daviess Counties.



Surface rocks dip nearly due west from the vicinity of Lyon at the rate of about 40 feet per mile. In the vicinity of Pellville the line of strike has turned almost 90 degrees clock-

wise, and the dip is slightly west of due north, at the rate of about 30 feet per mile. It is anticipated that the subsurface dip in any of the Chester sands will be a little greater than that seen at the surface due to the thickening of the Pottsville sandstones in a westerly direction. Levels run on the Hawesville coal coupled with elevations placed on the Jett sand by Mr. Hudnall, reveal a well defined though low fold plunging to the southwest from the Jett wells towards Old Panther church and Walnut Grove school. The axis of this structure—the Walnut Grove anticline flexes to the east north of the Ohio-Hancock County line as a glance at the structural map will verify. It has an axial plunge of about 15 feet to the mile. The downfold to the east into the St. Thomas syncline is small, being in many places less than 15 feet. The dip on the west or normal side of this anticline is greater, ranging between 30 and 35 feet per mile.

Only one fault, and it a small one, was observed in this region. This break strikes slightly south of west and has a displacement of about 20 feet. It may be seen in the road about one-half mile west of Sourwood schoolhouse in Ohio County, near the Hancock County line. This fault is apparently local and has little, if any, influence upon the Pellville oil field.

Other faulting in the Pellville district is unknown, though in the northern part of Hancock County a considerable disturbance has been noted just south of Hawesville, on the Hartford road in Lead Creek. This break is in the nature of normal block faulting with displacement of about 75 or 80 feet. The downthrow is on the northwest. Rocks in the fault plane are inclined as much as 70 or 75 degrees from the horizontal. On the structural map accompanying this report many of the wells now producing or dry in the Pellville field have been plotted, indicating very definitely the nature of the oil trend and its close relationship to the geologic structure of the region.

#### DEVELOPMENT AND PRODUCTION

The Pellville oil pool was opened by the Newman Oil Co., who drilled into production on the Jackson lease in 1920. Crude oil was found in this well in small quantities in the Cypress sandstone—"Jackson" sand—at a depth of 607 feet. Following the drilling in of this well others were brought in rather rapidly dur-



ing the next two years until about 20 wells were completed in this district with only two or three failures. Dry holes or "show" wells were completed on the Arrington, Brown, Ray, Tally and some additional "off structure" leases. The Sanders, Barlow, Stewart and some several other leases have produced



AN OHIO COUNTY LEASE

This view shows a portion of the Damer and Miller Co. property with three pumps and 2 tanks. Characteristic topography of the uplands in this part of Ohio County, Ky.

small amounts of natural gas, but the total volume of gas produced in this pool has been of small consequence. Production has been extended southwestward to within one mile of Mount Moriah church in Ohio County. In one locality there are not less than 70 or 75 producing wells in a circle one mile in circumference.

Most of the productive oil wells in the Pellville pool range from 2 to 25 barrels, with an average of 7 to 10 barrels per day. Salt water has been encountered in a large number of "down the dip" or "off structure" leases. Included among these are the Higdon, Stewart, Ray, Tally, Arrington, and others. Up to the present it is estimated that about 300 wells have been drilled in the Pellville oil pool, and are now productive of about 5 to 7 barrels per day. Considerable development activity is still in evidence as indicated by the fact that there are now about 20 rigs drilling in this field. Complete statistics of production, based upon actual pipe line runs, are as follows:



PETROLEUM PRODUCTION  
PELLVILLE DISTRICT, KENTUCKY  
HANCOCK COUNTY OIL PRODUCTION

Indian Refining Co.

1922	Bbls.	Value
October .....	644.06	\$1,101.34
November .....	1,327.81	2,270.56
December .....	652.71	1,130.75
Total .....	2,624.58	\$4,502.65

1923	Bbls.	Value
January .....	673.40	\$1,386.60
February .....	771.17	1,967.10
March .....	2,267.53	5,918.75
April .....	2,381.17	5,618.61
May .....	3,247.82	6,119.54
June .....	3,355.25	5,741.50
July .....	3,380.04	5,073.44
August .....	3,387.52	4,945.78
September .....	2,783.11	3,898.02
October .....	2,987.23	3,913.27
November .....	3,155.83	3,923.11
December .....	3,008.00	3,872.86
Total .....	31,398.07	\$52,378.58

1924. Ind Pipe L. Corp.	Bbls.	Value
January .....	1,930.62	\$3,433.41
February .....	3,222.44	7,121.59
March .....	4,159.04	9,610.09
April .....	3,470.67	8,171.00
May .....	3,266.38	6,861.03
June .....	2,976.54	5,325.03
July .....	2,983.80	4,659.80
August .....	2,796.56	3,685.59
September .....	2,874.25	3,453.99
October .....	3,218.00	3,526.61
November .....	3,174.12	3,740.38
December .....	2,584.49	3,101.37
Total .....	36,656.91	\$62,689.89

1925	Bbls.	Value
January .....	2,983.19	\$3,777.64
February .....	2,384.77	4,308.33

	Bbls.	Value
1925		
March .....	3,196.78	6,231.48
April .....	3,078.48	5,978.41
May .....	2,773.07	5,407.49
June .....	2,503.15	4,853.36
July .....	2,871.60	5,774.50
August .....	2,792.96	5,630.33
September .....	3,402.00	6,079.00
	<hr/>	<hr/>
	25,896.00	\$48,040.54

## TOTAL OIL RUNS HANCOCK COUNTY, KENTUCKY

(Oct., 1922-Sept., 1925, inclusive.)

	Bbls.	Value
1922 .....	2,624.58	\$4,502.65
1923 .....	31,398.07	52,378.58
1924 .....	36,656.91	62,689.89
1925 .....	25,896.00	48,040.54
	<hr/>	<hr/>
	96,575.56	\$167,611.66

## OHIO COUNTY OIL PRODUCTION

1922	Bbls.	Value
October .....	612.15	\$1,046.78
November .....	396.38	677.81
December .....	257.08	445.37
	<hr/>	<hr/>
Total for 3 months.....	1,265.61	\$2,169.96
1923	Bbls.	Value
January .....	161.71	\$332.98
February .....	85.35	217.71
March .....	166.62	434.88
April .....	240.64	567.81
May .....	411.61	775.56
June .....	648.82	1,110.26
July .....	810.01	1,215.83
August .....	894.62	1,306.14
September .....	720.21	1,008.73
October .....	1,253.36	1,641.90
November .....	2,140.85	2,661.35
December .....	2,255.41	2,903.89
	<hr/>	<hr/>
Total .....	9,789.21	\$14,177.04
1924	Bbls.	Value
January .....	1,235.85	\$2,197.84
February .....	3,062.97	6,769.16

## GEOLOGY OF THE PELLVILLE OIL POOL

29

1924	Bbls.	Value
March .....	4,299.77	9,935.26
April .....	4,684.12	11,027.82
May .....	7,524.32	15,804.83
June .....	7,041.18	12,596.67
July .....	8,614.78	13,453.70
August .....	8,240.16	10,859.71
September .....	8,751.27	10,516.40
October .....	9,550.78	10,466.70
November .....	7,942.27	9,339.17
December .....	7,683.85	9,187.80
Total .....	78,631.32	\$122,175.06

1925	Bbls.	Value
January .....	8,259.67	\$10,510.43
February .....	8,660.22	15,612.99
March .....	9,517.75	18,394.00
April .....	9,941.18	12,298.81
May .....	11,808.22	22,932.74
June .....	15,019.69	29,181.76
July .....	15,645.55	31,561.77
August .....	16,415.18	33,048.68
September .....	17,515.00	31,469.00
Total .....	112,682.46	\$205,010.18

TOTAL OIL RUNS, OHIO COUNTY, KENTUCKY  
(October, 1922-September, 1925, inclusive.)

	Bbls.	Value
1922 .....	1,265.61	\$2,169.96
1923 .....	9,789.21	14,177.04
1924 .....	78,631.32	122,175.06
1925 .....	112,682.46	205,010.18
Total .....	202,368.60	\$343,532.24

DAVIESS COUNTY OIL PRODUCTION  
(April, 1925-September, 1925, inclusive.)

1925	Bbls.	Value
April .....	85.67	\$158.49
May .....	613.61	1,239.55
June .....	958.48	1,926.83
July .....	983.66	2,032.52
August .....	1,540.04	3,204.52
September .....	2,306.00	4,303.00
	6,487.46	\$12,864.91

TOTAL OIL RUNS, PELLVILLE DISTRICT, KENTUCKY  
(By counties.)

	Bbls.	Value
Hancock County .....	96,575.56	\$167,611.66
Ohio County .....	203,368.60	343,532.24
Daviess County .....	6,487.46	12,864.91
	306,431.62	\$524,008.81

### SUMMARY

The Pellville oil pool, discovered in 1920, is now definitely outlined, though many important offset locations still remain to be drilled. Outlying dry and salt water wells have about delimited the advancement of productive territory of commercial grade. The original oil strike was made in Hancock County and successful development has followed a southwestward trend into Ohio County with some scattered production coming from close in leases in Daviess County. The Indian Pipe Line Co. entered the field with its line to Owensboro and made its first runs from Hancock and Ohio Counties in October, 1922. Production was first run from Daviess County leases in April, 1925. Total runs from this entire field up to and including September, 1925, were 306,431.62 barrels, valued at \$524,008.81.

A factor of distinction and unusual importance in the Pellville oil pool has been the occurrence of four separate productive oil horizons. Except in the shallow "Pottsville sand" fields of Floyd, Knott and Knox Counties of eastern Kentucky, this circumstance is not duplicated elsewhere in this state. The productive Pellville sands in descending order are the "Stevens," the "Jett," the "Jackson" and the "Barlow" sands. Each of these is definitely correlated with a well known stratigraphic member of the Chester (Mississippian) series, and each it a true silica sand of shallow depth. No productive limestones are known in this field, and deep oil and gas sands, productive elsewhere, are also unknown. Because of the nature of these sands, the oil production in the Pellville pool has not been spectacular, as was the case in the Warren and Lee County, Kentucky, fields. The curve of production increase has been steady and strong, and every indication leads to the conclusion that the productive life and decline curve of this field and its individual leases will be of the same character. The productive record of this field

when complete will undoubtedly closely resemble that of the important Berea and Wier "true sand" fields of northeastern Kentucky.

These prospects, coupled with the fact that the region is reasonably accessible to rail lines and automobile highways, has stimulated prospecting in the Pellville district. Low topographic relief has operated to advance development. A good collecting pipe line service has brought quick returns to the successful "wild-catting" ventures. These factors, all combined, have been and will continue to be a real inducement to operators in this field, who, if they cannot "bring in" gushers, have a reasonable assurance of success in drilling leases favorably located as to structure. The Pellville oil pool, taken as a whole, gives promise of being one of the really important pools of Kentucky. Its location and general geology is logically suggestive of the possible occurrence of other important undiscovered oil pools similarly situated within the periphery of the Western Coal Field.

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Written August, 1923.

Revised September, 1925.



## II.

### OIL AND GAS GEOLOGY OF THE WILLIAMSBURG REGION

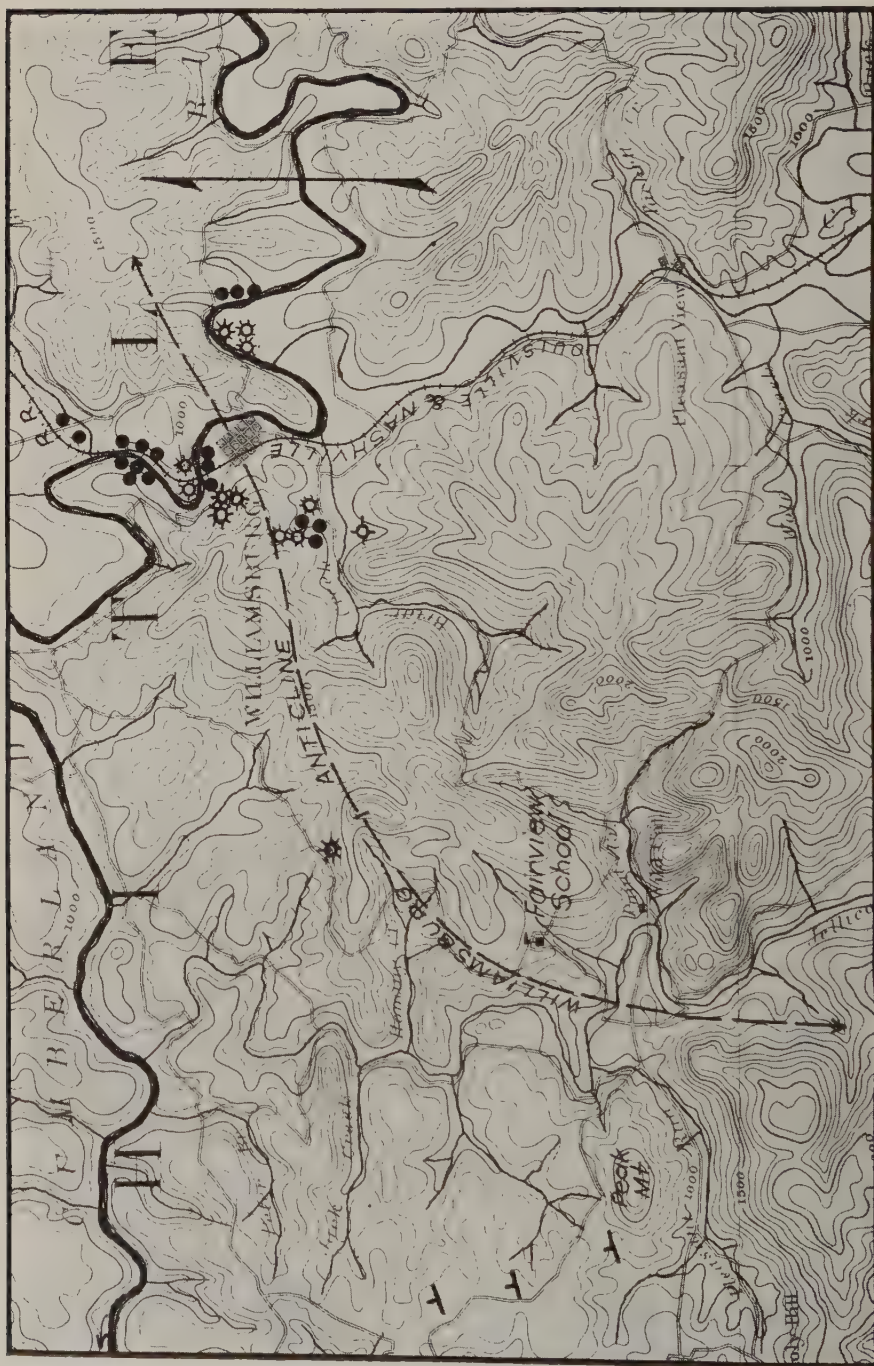
#### INTRODUCTION

The occurrence of oil and gas in commercial quantities in the vicinity of Williamsburg, Whitley County, Kentucky, was recognized in 1904 by J. B. Hoeing, who discussed<sup>1</sup> at some length the various productive and nonproductive sands of the region. The first wells in this section were drilled in 1902, and produced oil and gas from shallow sands in the Pottsville series, the producing depths being from 300 to 500 feet, and from 700 to 800 feet. An attempt by the Iroquois Oil and Gas Company to deepen a number of these old wells in later years and thereby increase their production in the field, was successful in producing rather large quantities of natural gas at depths ranging from 1,155 feet to 1,180 feet and from 1,365 feet to 1,370 feet, in the Big Lime (Mississippian).

The reported occurrence of this gas in rather large quantities caused the writer to make a reconnaissance of this area in April, 1920, the results of which were the discovery of a doming anticline, the axis of which followed a trend to the northeast through Williamsburg. This structure was first briefly announced in the literature by the writer in describing the gas field adjoining Williamsburg in a manuscript prepared in 1921<sup>2</sup> and published in January, 1922. Later in 1922 the preparation of a reconnaissance structural map of the region was undertaken by the writer, who was assisted by Mr. James S. Hudnall in the field during the months of March, April and May. A structural map based on the Lily coal (commonly called river coal near Williamsburg) was prepared by running levels with an Aneroid barometer checked upon bench marks along the Louisville and Nashville railroad and the Cumberland river. In those areas removed from the railroad and the river, a barometer was read at Williamsburg, and the field barometer was checked against it. The map is regarded as accurate within the limits made possible

<sup>1</sup> Oil and Gas Sands of Kentucky. Hoeing. Ky. Geol. Survey, Bull. No. 1, Series III, 1905.

<sup>2</sup> Conservation of Natural Gas in Ky. Jillson. 1922, pp. 50-51.



THE WILLIAMSBURG ANTICLINE

The base is the U. S. G. S. Williamsburg topographic sheet, reproduced here to scale 1:125,000. A few of the producing wells and dry holes have been located.

by a base of reconnaissance topography which was executed to the scale of 1:125,000 by the U. S. Geological Survey.<sup>3</sup>

#### LOCATION

Williamsburg, the seat of Whitley County, is located in the central part of the county on the Cumberland river, the south by Claiborne, Campbell and Scott Counties, Tennessee created in 1818 from parts of Knox, Laurel, Pulaski and Wayne County, covering about 456 square miles, is bounded on the north by Laurel County; on the east by Bell and Knox Counties; on the south by Claiborne, Campbell and Scott Counties, Tennessee, and on the west by McCreary County, Kentucky. It was created in 1818 from parts of Knox, Laurel, Pulaski and Wayne Counties. Later its western boundary was established on the Cumberland river and Jellico Creek when McCreary County was formed. Whitley was named in honor of Colonel William Whitley, a celebrated Kentucky pioneer whose fine old brick residence still stands on the old wilderness road near Crab Orchard in southern Lincoln County, Kentucky.

Whitley County is located in southeastern Kentucky in the Jellico coal field about 55 miles in air line slightly west of north of Knoxville, Tennessee, and a little over 90 miles in an air line slightly east of south of Lexington, Kentucky. It is approximately 140 miles south of east of Louisville, Kentucky, 170 miles southeast of Cincinnati, Ohio, and 150 miles northeast of Nashville, Tennessee. The county is traversed on a north and south line by the Cincinnati-Knoxville main line of the Louisville and Nashville railroad. Corbin, a town of 3,406 population,<sup>5</sup> on the Laurel river, is found in the northern part of Whitley County and is a junction town for the Cumberland River Division of the Louisville and Nashville railroad.

Jellico, a coal mining town with 2,349 inhabitants,<sup>6</sup> is located on the Kentucky-Tennessee line, part of the town being in each state. Williamsburg is 15 miles in an air line northwest of the Pine Mountain. Though situated on the Cumberland river, water transportation from Williamsburg to Burnside, Pulaski

<sup>3</sup> Williamsburg (Ky.-Tenn.) Quadrangle. Knight and Yeates. U. S. G. S., 1894.

<sup>4</sup> U. S. Census, 1920.

<sup>5</sup> U. S. Census, 1920.

<sup>6</sup> U. S. Census, 1920.

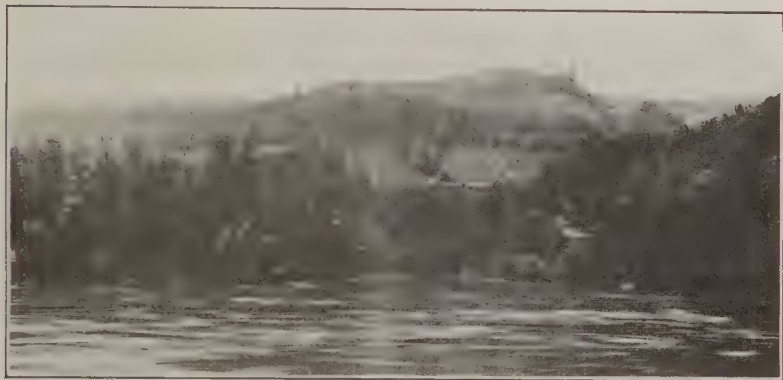




BRIAR CREEK VALLEY

The view is nearly due east down the drainage from an elevation of about 1,400 feet. The sharp bend of the Cumberland River above Williamsburg is at the foot of the distant ridge.

County, and points below is impossible at present because of the lack of slack water and the occurrence of the Cumberland Falls (56 feet high) about 16 miles in an airline northwest of the town.



CREST OF WILLIAMSBURG ANTICLINE

This view along the Cumberland River is from the vicinity of the Steely lease. The topography is characteristic of the region.

#### TOPOGRAPHY AND DRAINAGE

The topography of the Williamsburg area is thoroughly characteristic of the southeastern Kentucky coal field. The ridges are high, narrow and irregular. The valleys are V-shaped and meandering. There is very little bottom land, except closely adjacent to the Cumberland river, and no flat uplands occur, except in a region known as the "Flatwoods," which lies on the western boundary of the area under discussion, north of Peak Mountain (al. 1,750 ft., approx.) and west of Jellico Creek. Differences of elevation varying from 600 to 1,000 feet are common throughout this region. Altitudes ranging from 1,800 to 2,000 feet are common on the larger mountains of the region, and a few elevations in excess of 2,200 feet occur on the peaks between Clear Fork of the Cumberland river and Jellico Creek. The elevation of the Cumberland river bottom is about 900 feet in the vicinity of Williamsburg, and tributary drainage rises above this altitude. The elevation of the Louisville and Nashville railroad at the Williamsburg depot is given as 939 feet.

The principal drainage of the region is the Cumberland river and its tributaries, chief among which are the Clear Fork



and Jellico Creek. Each of these latter streams flow to the northwest to join the Cumberland river. Smaller creeks of minor importance are Brier and Wolf Creeks, tributaries to the Cumberland river, and Ryan Creek, Pleasant Run and Paint Creek, tributaries to Jellico Creek. The Louisville and Nashville railroad, whose Cincinnati and Knoxville trunk line passes through Williamsburg, is the only line of through rail transportation in the region.

#### STRATIGRAPHY—SURFACE ROCKS

Sediments of Pottsville age (basal Pennsylvanian) cover the entire area under discussion. These consist of an alternating sequence of sandstones, sandy conglomerates, shales and coals. Although the Mississippian limestone is exposed in the vicinity of High Cliff on the Clear Fork along the Pine Mountain fault, no sediments of greater age than the coal measures are found exposed in the Williamsburg region. A detailed stratigraphic section, totaling 1,602 feet, showing all of the above drainage sediments of the Williamsburg region, is given herewith:

#### GENERAL STRATIGRAPHIC SECTION

##### WHITLEY COUNTY, KY.

Pottsville Sediments (Pennsylvanian) all exposed.

Sandstone .....	30
Shale, sandy .....	40
Limestone, fossil .....	7
Shale .....	25
Coal, cannel .....	1½
Sandstone (clifted) .....	40
Shale and sandstone .....	100
Coal .....	3½
Shale .....	10
Sandstone .....	20
Shale, black .....	3
Shale, fossils .....	25
Shale, blue .....	10
Coal (fire clay) .....	2½
Shale and sandstone .....	120
Sandstone .....	3
Coal .....	1
Shale .....	55
Coal and shale .....	3

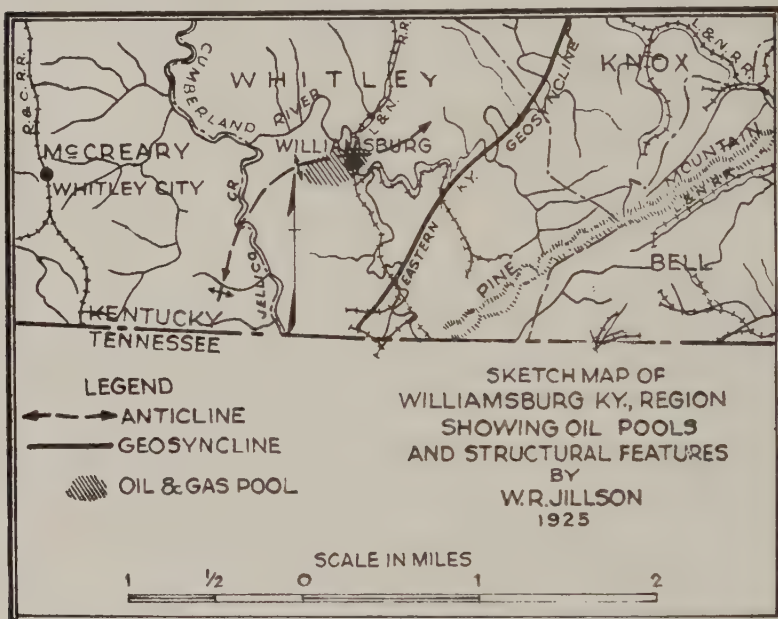
Sandstone .....	25
Shale, sandy .....	30
Shale .....	20
Coal (semi-cannel) .....	1½
Shale .....	45
Conglomerate .....	65
Coal .....	1½
Shale .....	35
Coal .....	1½
Sandstone .....	35
Shale, gray .....	3
Coal (Jellico) .....	3½
Sandstone .....	55
Shale, sandy .....	25
Coal (Blue Gem) .....	2
Shale, black .....	25
Coal (Stray) .....	1
Shale .....	10
Sandstone .....	20
Shale .....	5
Coal (Lower Blue Gem) .....	1
Shale, black .....	20
Coal (Stray) .....	1
Shale, gray .....	15
Sandstone, pink .....	35
Shale, black .....	20
Sandstone, cross-bedded .....	15
Shale, black .....	35
Coal (Lily—River coal) (Key Bed) .....	2
Shale (position of Williamsburg) .....	40
<hr/>	
1,062.50	

#### STRATIGRAPHY—SUBSURFACE ROCKS

The unexposed rocks of the Williamsburg region within 3,000 feet of drainage consists of sandstones, shales, sandy conglomerates, coals, limestones and calcareous shales. These sediments are all of the Paleozoic age. The uppermost subsurface rocks are a continuation of those found above drainage. These lower coal measures (Pottsville) composed of sandstones, shales, sandy conglomerates and coals are about 1,000 or 1,100 feet in thickness, as evidenced by an examination of a number of well kept drill records.

Rocks of the Mississippian age, limestones, shales, sandstones and fine sandy shales totaling about 500 or 600 feet underlie

the subsurface continuation of the coal measures. Included within this stratigraphic division and in its upper part is found the Big Lime (Chester) and Big Injun (Meramec) oil and gas sands. The top of the Devonian sediments—Chattanooga Black



Shale, 90-150 feet in thickness—occurs at a depth of about 1,700 to 1,750 feet below Williamsburg. The corniferous limestone underlying the shale is poorly interpreted in all deep well records, but is probably about 50 or 60 feet in thickness. It is thought that the Silurian formations, limestones and calcareous gray-green shales, and red beds will set in here at about 1,800 to 1,825 feet in depth, but their approximate thickness is unknown. Ordovician rocks, limestones and calcareous blue-gray shales should be encountered at about 2,300 feet in depth, while the top of the Trenton limestones (Mohawkian) might be expected at about 3,000 or 3,100 feet. The deep John Foley No 1 well (3,350 feet) located on structure pierced these calcareous sediments but found them dry. For a further consideration of the subsurface stratigraphy the reader is referred to a few selected well logs presented herewith.

WELL RECORDS  
WHITLEY COUNTY

LOG No. 1.

J. P. SHARP FARM  
Rockhold Station

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil .....	14	14
Black shale .....	36	50
White lime .....	5	55
Coal .....	1½	56
Blue slate ....	88½	145
White sand .....	10	155
Black slate .....	30	185
White sand .....	20	205
Black slate .....	110	315
Gray sand .....	190	505
Black slate .....	40	545
White sand .....	165	710
Black slate .....	30	740
White sand—oil show .....	230	970
Black slate .....	35	1005
Sand .....	26	1031
Coal .....	2	1033
Black slate .....	4	1037
White sand .....	5	1042
Black shale—base of Pottsville .....	15	1057
<b>MISSISSIPPIAN SYSTEM</b>		
White lime .....	5	1062
Black shale .....	4	1066
White sand .....	25	1091
White shale .....	60	1151
White lime .....	54	1205
White shale .....	50	1255
White lime .....	30	1285
White shale .....	5	1290
White lime .....	265	1555
Brown sand .....	35	1590
Blue sand .....	27	1617
Blue shale .....	188	1805
<b>DEVONIAN SYSTEM</b>		
Brown shale } .....	120	1925
White shale } (Devonian) .....	15	1940
Brown shale } .....	5	1945
White limestone .....	60	2005
<b>SILURIAN SYSTEM</b>		
Red shale .....	5	2010

Strata	Thickness	Depth
<b>SILURIAN SYSTEM</b>		
White shale .....	35	2045
Red shale .....	15	2060
White shale .....	5	2065
White lime .....	70	2135
<b>ORDOVICIAN SYSTEM</b>		
Shale .....	70	2205
White lime .....	25	2230
Total depth .....		2230

## LOG No. 2.

WATER CO. WELL  
Williamsburg

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Drift .....	28	28
Gravel .....	3	31
Slate .....	14	45
Sand—oil at 47 .....	24	69
Slate .....	11	80
Sand—oil at 87 .....	10	90
Slate .....	30	120
Sand .....	8	128
(All in Pottsville).		
Total depth .....		128

## LOG No. 3.

PERKINS' WELL  
Williamsburg

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Clay .....	20	20
Black sand .....	10	30
Blue slate .....	60	90
Sand—oil at 100 .....	10	100
Slate .....	50	150
White sand .....	28	178
Coal .....	2	180
White sand .....	60	240
Slate .....	5	245
White sand—oil at 360 .....	120	365
Slate .....	5	370
Coal .....	5	375
(All in Pottsville).		
Total depth .....		375



## LOG No. 4.

NELSON WELL No. 2  
Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift .....	28	28
Slate .....	102	130
Sand .....	35	160
Slate .....	10	175
White sand .....	75	250
Slate .....	5	255
White sand .....	115	370
Coal .....	5	375
Slate .....	5	380
White sand .....	90	470
Slate .....	5	475
White sand .....	98	573
Slate .....	7	580
White sand—oil at 645 .....	68	648
Coal .....	2	650
Slate and shells .....	115	765
Slate .....	1	766
White sand—oil show at 770 and 805, salt water at 338 .....	74	840
Sand .....	8	848
Slate .....	23	871
(All in Pottsville).		
Total depth .....		871

## LOG No. 5.

ELECTRIC LIGHT PLANT WELL  
Williamsburg  
(Partial record)

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
White sand—oil at 385 .....	50	425
Slate .....	5	430
White sand .....	100	530
Slate .....	5	535
White sand .....	35	570
Slate .....	5	575
White sand—oil and gas at 605 .....	85	660
Slate and shells .....	75	735
White sand—oil and gas at 745.....	20	755
Brown shale .....	11	766
White sand (base of Pottsville) .....	45	811



WILLIAMSBURG SAND ON OUTCROP

High above the waters of the Clear Fork of the Cumberland River in the Gap the Pottsville conglomerate sandstone producing near Williamsburg at about 800 feet is brought above drainage by the Fine Mountain Fault.

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Blue slate .....	10	821
Pink slate—Mauch Chunk .....	5	826
Total depth .....		826

## LOG No. 6.

SUTTON FARM  
1 mile S. W. of Williamsburg

Strata	Thickness	Depth
Soil .....	5	5
Sand and slate .....	140	145
Shale and shells .....	110	255
Black slate .....	147	402
Sand .....	185	587
Slate .....	15	602
Sand .....	15	617
Slate .....	80	697
White sand—gas at 784 .....	87	784
Black shale and slate .....	19	803
Sand—oil at 957 .....	172	975
(All in Pottsville).		
Total depth .....		975

## LOG No. 7.

G. W. RAINS No. 2  
Near Williamsburg  
(Partial record)

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		753
Sand—oil at 770, 790 and 811 .....	82	835
Shale (with coal) .....	45	880
MISSISSIPPIAN SYSTEM		
Sand .....	23	903
Light shale .....	15	918
Lime .....	17	935
Dark shale .....	10	945
Lime .....	10	955
Pink slate—Mauch Chunk .....	45	1000
Lime .....	20	1020
Pink slate—Mauch Chunk .....	10	1030
Lime .....	15	1045
Light shale .....	5	1050
Lime .....	25	1075

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale and lime .....	95	1170
Lime—gas at 1369 .....	211	1381
Total depth .....		1381

LOG No. 8.

STEELY FARM No. 2  
1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil .....	10	10
Sand .....	20	30
Slate .....	105	135
Sand .....	150	285
Lime .....	20	305
Sand .....	75	380
Lime .....	5	385
Coal .....	5	390
White sand .....	202	592
Shale .....	2	594
Black shale .....	30	624
Coal .....	2	626
Sand—salt water at 628 .....	24	650
Slate and shells .....	100	750
Sand .....	24	774
Black slate (base of Pottsville) .....	6	780
MISSISSIPPIAN SYSTEM		
Pink rock—Mauch Chunk .....	20	800
Blue slate .....	35	835
Red rock .....	10	845
Lime .....	10	855
Blue slate .....	7	862
Total depth .....		862

LOG No. 9.

STEELY FARM No. 4  
1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift .....	30	30
Black slate .....	19	49
Sand .....	4	53
Black slate .....	82	135
White sand .....	170	305

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Lime .....	5	310
White sand .....	28	338
Slate .....	2	340
Sand .....	40	380
Lime (?) .....	5	385
Coal .....	5	390
White sand .....	200	590
Slate .....	5	595
Black shale .....	20	615
Coal .....	2	617
White sand .....	33	650
Black shale .....	5	655
Sand .....	15	670
Slate .....	5	675
Sand .....	15	690
Slate .....	10	700
Brown shale .....	44	744
Sand—oil .....	46	790
Slate (base of Pottsville) .....	5	795
MISSISSIPPIAN SYSTEM		
Pink rock—Mauch Chunk .....	5	800
Total depth .....		800

LOG No. 10.

STEELY FARM No. 5  
1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift .....	25	25
Sand .....	5	30
Slate .....	15	45
Sand .....	10	55
Slate .....	25	80
Black slate .....	55	135
White sand .....	200	335
Slate .....	5	340
White sand .....	40	380
Lime .....	5	385
Coal .....	5	390
White sand .....	202	592
Slate .....	3	595
Sand .....	55	650
Coal .....	2	652



Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sand—gas at 660 .....	8	660
Lime .....	10	670
Slate .....	15	685
Shale .....	59	744
White sand—oil at 750, 770 and 790.....	54	798
Slate .....	6	804
(All in Pottsville).		
Total depth .....		804

## LOG No. 11.

 STEELY FARM No. 8  
 1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift and clay .....	20	20
Slate .....	10	30
Blue shale .....	20	50
Coal .....	2	52
Slate .....	93	145
Gray sand .....	25	170
White sand .....	170	340
Slate .....	10	350
White sand .....	55	405
Coal .....	5	410
White sand—oil at 550 .....	140	550
Sandstone .....	5	555
Slate .....	5	560
White sand .....	43	603
Shale .....	2	605
Slate .....	5	610
Sand .....	50	660
Coal .....	2	662
Sand .....	3	665
Lime .....	10	675
Slate .....	15	690
Sand .....	15	705
Slate and shells .....	20	725
Shale (base of Pottsville) .....	41	766
MISSISSIPPIAN SYSTEM		
Sand and pink rock—Mauch Chunk .....	29	795
Red rock—Mauch Chunk .....	30	825
Black sand and slate .....	21	846
Red rock—Mauch Chunk .....	10	850
Black slate .....	4	860
Lime .....	10	870

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Slate and shells .....	30	900
Slate .....	10	910
Red rock .....	10	920
Lime .....	5	925
Slate and shells .....	60	985
Slate .....	15	1000
Lime .....	35	1035
Slate .....	5	1040
Lime .....	285	1325
Granite (?) .....	25	1350
Lime .....	20	1370
Lime and flint .....	5	1375
Flint .....	15	1390
Lime and flint .....	30	1420
Lime .....	35	1455
Slate .....	10	1465
Black shale .....	25	1490
Shale .....	20	1510
Lime .....	20	1530
Slate .....	40	1570
Lime .....	10	1580
<b>DEVONIAN SYSTEM</b>		
Brown shale (Devonian) .....	120	1700
White slate .....	20	1720
Gray sand .....	5	1725
White slate .....	15	1740
<b>SILURIAN SYSTEM</b>		
Blue slate .....	30	1770
Slate and shells .....	50	1820
Slate .....	10	1830
Sand .....	20	1850
Slate .....	10	1860
Sand .....	10	1870
<b>ORDOVICIAN SYSTEM</b>		
Sand and lime .....	20	1890
Lime .....	30	1920
Lime and red rock .....	15	1935
Lime .....	235	2170
Total depth .....		2170

## LOG No. 12.

WELL AT MOUTH OF CLEAR FORK  
(Partial record)

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, shale and coal .....	828	828
Shale .....	57	885
Sand (base of Pottsville) .....	75	960
<b>MISSISSIPPIAN SYSTEM</b>		
Lime .....	10	970
Pink rock—Mauch Chunk .....	35	1005
Lime .....	20	1025
Shale .....	5	1030
Lime .....	30	1060
Shale .....	30	1090
Lime .....	15	1105
Shale .....	55	1160
Lime .....	370	1530
Gas well.		—
Total depth .....		1530

## LOG No. 13.

S. M. Brown, No. 1, lessor. Completed: Jan. 16, 1905. Production: Dry; casing pulled, well abandoned. Authority: New Domain Oil & Gas Co.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil, yellow, soft .....	15	15
Shale, hard, black .....	85	100
Sandstone, gray, hard .....	10	110
Shale, hard, black, soft .....	25	135
Sandstone white, hard .....	4	140
Sand, white, medium .....	12	152
Shale, brown, soft .....	33	185
Shale, black, soft .....	10	195
Coal, black, soft .....	2	197
Shale, brown, hard, limy .....	5	202
Shale, brown, soft .....	108	310
Sand gray, soft .....	90	400
Shale, white, soft, limy (gas 415) .....	15	415
Sand, white, soft .....	85	500
Shale, hard, black, soft .....	20	520
Sandstone, white, hard, shaly .....	15	535
Sand, gray, hard .....	165	700
Shale, hard, brown .....	20	720
Sand, yellow, hard .....	50	770

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, hard, yellow .....	5	775
Sand, white, hard (oil show 800) .....	25	800
Sand, gray, hard .....	100	900
Shale, hard, black .....	54	954
Sandstone, gray hard .....	29	983
Coal, black, soft .....	2	985
Shale, hard, white, soft .....	10	995
MISSISSIPPIAN SYSTEM		
Shale (red rock), hard .....	18	1013
Limestone and shells, red, very hard.....	37	1050
Shale (red rock), very hard .....	50	1100
Limestone (Big Lime), white, very hard....	140	1240
Limestone, blue, hard .....	5	1245
Limestone, blue, hard .....	45	1290
Shale, black, soft .....	6	1296
Limestone, white, hard (gas 1470).....	234	1530
Sand, white, hard .....	60	1590
Shale, blue, soft .....	230	1820
Total depth .....		1820

## LOG No. 14.

John Foley, No. 1, lessor. Iroquois Oil Co., Knoxville, Tenn., lessee. Location:  $\frac{3}{4}$  mile west of Williamsburg,  $\frac{1}{2}$  mile above mouth on Briar Creek. Commenced: September, 1920. Incomplete record secured July 1, 1921. Driller and authority: Tom Langton. Casing-head elevation: 1036 A. T. 2 feet above Lily roal. Production: Dry. Structural position: South flank of Williamsburg Anticline  $\frac{3}{4}$  mile from crest.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Clay and soil .....	6	6
Sandstone .....	104	110
Shale, hard .....	30	140
Sand, hard .....	290	430
Shale, hard .....	10	440
Sand, hard .....	200	640
Shale, hard .....	20	660
Sand, hard (oil show 728) .....	103	763
Shale, hard .....	7	770
Sand hard .....	42	812
Shale, hard .....	10	822
Sand, hard (Williamsburg oil sand 865) .....	43	865
Shale, hard .....	25	890
Sand, hard (oil, gas, water 1122) .....	225	1145



CLEAR FORK GAP

All water level gaps in the Pine Mountain are similar. This gorge cut by the Clear Fork is much like the Cumberland gateway at Pineville, and the "Breaks of Sandy."

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Lime shell and shale, hard (Little Lime) ....	20	1165
Limestone, hard (Big Lime) .....	80	1245
Shale .....	10	1255
Limestone (Big Lime) .....	245	1500
Shale, hard .....	10	1510
Flint rock .....	40	1550
Shale, hard .....	10	1560
Lime shell .....	20	1580
Shale, hard .....	20	1600
Lime shell .....	10	1610
Red rock .....	15	1625
Shale, hard .....	75	1700
<b>DEVONIAN SYSTEM</b>		
Shale, brown (Chattanooga) .....	90	1790
Lime shell .....	20	1810
<b>SILURIAN SYSTEM</b>		
Shale, hard .....	40	1850
Limestone, brown .....	850	2700
Limestone, black .....	15	2715
Limestone, brown .....	635	3350
Total depth, July 1, 1921.....		3350

NOTE.—The Silurian-Ordovician contact occurs within the upper quarter of the 850 feet of brown limestone above 2,700 feet.

#### LOG No. 15.

Rose, No. 1, lessor. Iroquois Oil Co., lessee. Location: 1½ miles west of Williamsburg. Completed in the spring of 1920. Production: about 4,000,000 cu. ft. gas. Authority: E. C. Dicel.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil .....	2	2
Sand .....	148	150
Shale, hard .....	120	270
Sand .....	320	590
Shale, hard .....	20	610
Sand .....	95	705
Shale, hard .....	25	730
Sand .....	85	815
Shale, hard .....	83	898
Sand (some oil) .....	35	933
Shale, hard .....	30	963



Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Shale (red rock), sandy .....	12	975
Shale, hard .....	15	990
Limestone (Little Lime) .....	20	1010
Shale, hard .....	90	1100
Limestone (Big Lime), (gas 1,265).....	205	1305
Total depth .....		1305

**LOG No. 16.**

Baptist Educational Society, No. 1, lessor. Empire Oil & Gas Co., lessee. Location: First left hand branch of Dog Slaughter Creek, 1 mile north of Dog Slaughter Creek. Completed: 1918. Contractors: J. H. Wilt Drilling Co. Authority: E. C. Disel.

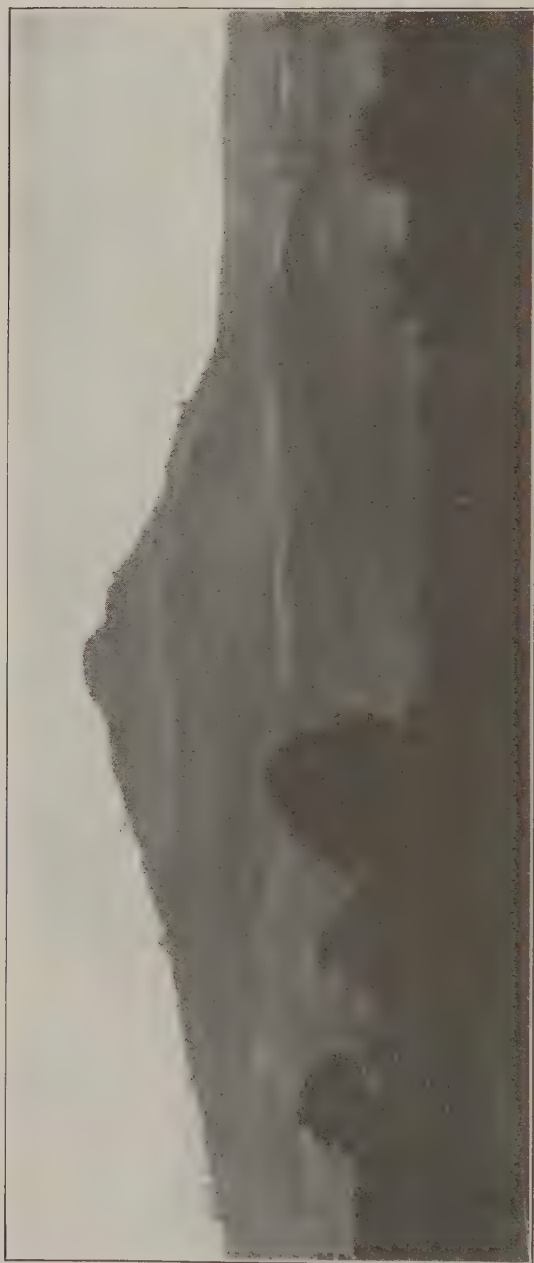
Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Drift, yellow, soft .....	6	6
Rock, very firm, yellow, hard .....	180	186
Shale, hard, black and shells .....	35	221
Shale, gritty, white firm and sand .....	85	306
Shale, black, soft and coal .....	15	321
Sand, gray, hard .....	100	421
Shale, hard, black and soft .....	10	431
Shale, black, hard .....	7	438
Shale, hard, blue, sticky .....	30	468
Shale, hard, blue and shells .....	70	538
Shale, shell, gravy, very hard, limy .....	20	558
Shale, sticky, red, soft .....	15	573
Sand, red firm .....	10	583
Sand, pink, hard .....	5	588
Coal, black, soft .....	7	595
Sand, white, hard .....	15	610
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, hard, red, soft .....	5	615
Shell, hard, dark .....	10	625
Shale, hard, white, soft .....	15	640
Sand, white, hard .....	20	660
Shale, hard, white, caving .....	10	670
Shale, hard, dark, limy .....	10	680
Shell, dark, hard .....	7	687
Limestone, hard, dark .....	12	699
Shale, hard, white, soft .....	5	704
Sand, white, hard, very close (Maxon) .....	40	744
Limestone, white, soft (Little Lime).....	4	748

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Sand, white, hard .....	7	755
Limestone, white, soft, Big Lime (184) .....	34	789
Limestone, white, hard, Big Lime (184).....	45	834
Limestone, brown soft Big Lime (184).....	10	844
Limestone, brown, firm, Big Lime (184).....	20	864
Limestone, brown, hard, Big Lime (184).....	25	889
Limestone, brown, soft, Big Lime (184).....	14	903
Flint, hard, dark, Big Lime (184).....	15	918
Limestone, brown, soft, Big Lime (184).....	6	924
Limestone, flint, hard, dark, "Big Lime" (184) .....	15	939
Sandstone, gray, firm, limy (odor of gas)....	35	974
Shell, hard, dark .....	10	984
Limestone, white, soft .....	30	1014
Sand, pink, soft, shaly .....	5	1019
Sand, gray, hard .....	161	1180
Shale, hard, white, soft .....	30	1210
Shell, hard, black .....	10	1220
Shale hard, green, firm (New Providence)..	80	1300
<b>DEVONIAN SYSTEM</b>		
Shale, black, soft (Chattanooga) .....	90	1390
Shale, hard, white, soft .....	60	1450
Limestone, gray, hard .....	20	1470
<b>SILURIAN SYSTEM</b>		
Shale hard, white, soft .....	10	1480
Limestone, gray, hard .....	12	1492
Shale, hard, white, soft .....	10	1502
Limestone, gray, hard .....	10	1512
Shale, hard, blue, firm .....	8	1520
Limestone, black, hard .....	60	1580
Total depth .....		1580

**LOG No. 17.**

H. M. Young, No. 1, lessor. Empire Oil & Gas Co., lessee. Location: about 13 miles from Williamsburg, and about 6 miles from Cumberland Falls, on the road from Williamsburg to Cumberland Falls. Head of Dog Slaughter Creek. Completed: Feb. 5, 1919. Authority: E. C. Disel.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Drift, yellow, soft (little water) .....	15	15
Sand, rock, yellow, hard .....	45	60
Sand, gritty, blue, firm (hole full of water)	90	150



PEAK MOUNTAIN

This symmetrical upland is about 2,150 feet high. The view is from Fairview Schoolhouse with Jellico Creek flowing to the right in the middle distant valley.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, hard, black, soft .....	35	185
Sandstone, hard white .....	10	195
Sand, gray, soft .....	55	250
Shale, hard, black, soft .....	10	260
Shale, white, hard, sandy .....	65	325
Shale, hard, brown, soft .....	40	365
Sandstone, gray, hard .....	10	375
Sand, white, medium (settled quickly).....	80	455
Shale, hard, black, soft .....	3	458
Shale, gray, hard, limy .....	14	472
Shale, hard, brown, soft .....	4	476
Sand, white, hard, medium .....	52	528
Coal, black, soft .....	1	529
Shale, hard, brown, soft .....	22	551
Sandstone, hard, gray (little gas 555).....	10	561
Shale, hard, blue, soft and shells.....	74	635
Sandstone, hard, gray .....	10	645
Shale, hard, brown, soft .....	15	660
Sandstone, dark, very hard .....	10	670
Shale, hard, brown, soft .....	15	685
Sandstone, gray, hard .....	10	695
Shale, hard, brown .....	15	710
Limestone black, very hard .....	5	715
Shale, brown, soft .....	10	725
Sandstone, gray, hard .....	20	745
Shale and shells, hard, white, soft.....	45	790
Sandstone, gray, hard .....	10	800
Shale, hard, red, soft .....	40	840
Shale, hard, gray, soft .....	15	855
Sand, gray, medium .....	22	877
Shale, hard, brown, soft .....	11	888
Shale, hard, gray, soft.....	14	902
Sand, gray, hard .....	10	912
MISSISSIPPIAN SYSTEM		
Limestone, brown, hard .....	28	940
Shale, hard, gray, soft .....	5	945
Limestone, brown, hard .....	5	950
Shale, hard, gray, soft .....	10	960
Limestone, white, hard .....	25	985
Shale, hard, white, soft .....	5	990
Limestone, hard, white, Big Lime (180) .....	10	1000
Limestone, hard, brown, Big Lime (180).....	70	1070
Limestone, hard, gray, Big Lime (180).....	5	1075
Limestone, hard, brown, Big Lime (180).....	18	1093
Sand, soft, gray (light oil show), Big Lime		

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
(180) .....	5	1098
Limestone, brown, hard, Big Lime (180).....	7	1105
Limestone, hard, gray, Big Lime (180).....	35	1140
Limestone, gray, hard, Big Lime (180).....	30	1170
Sand, brown, limy (50,000 cu. ft. gas at 1185)	31	1201
Total depth .....		1201

## LOG No. 18.

Nelson, No. 1, lessor. The Cumberland Bend Oil Co., lessee. Location:  $1\frac{1}{2}$  miles southeast of Williamsburg. Completed in 1907. Shot Nov. 15, 1907, 90 qts. Production: about  $1\frac{1}{2}$  bbls. Authority: E. C. Disel, Williamsburg.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale and coal .....	455	455
Sand, white .....	10	465
Sand, white .....	30	495
Limestone, white .....	10	505
Sand, white .....	70	575
Shale, hard .....	7	582
Shale, hard .....	3	585
Sand white (gas 595; oil 605).....	55	640
Sand, gray .....	20	660
Shale, hard, shelly .....	55	715
Sand, gray .....	20	735
Shale, hard .....	31	766



Mountain Home Near Williamsburg, Ky.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sand (gas) .....	1	767
Sand, white (oil 767 to 780).....	13	780
Sand, white .....	25	805
Sand, white (oil and gas 809).....	6	811
Shale, hard .....	4	815
Shale, hard .....	10	825
Flint rock .....	1½	826½
Total depth .....		826½

## LOG No. 19.

G. W. Rains, No. 3, lessor. Location: mouth of Clear Fork Creek, 1½ miles southeast of Williamsburg. Cased Feb. 14, 1919. Shot with 10 qts. glycerine by the Ky. Glycerine Co. Recommended drilling at 939 feet. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale and coal .....	939	939
Shale, hard .....	3	942
MISSISSIPPIAN SYSTEM		
Shale and shells, hard, pink (Mauch Chunk) .....	68	1010
Sand, gray .....	15	1025
Shale, hard, red .....	2	1027
Limestone, light .....	51	1078
Shale, hard, pink, light (Mauch Chunk).....	48	1126
Limestone, blue .....	5	1131
Shale, hard, dark .....	46	1177
Limestone, black (show of oil).....	14	1191
Limestone, black .....	24	1215
Shale, hard, light .....	6	1221
Limestone, light, Big Lime (253).....	63	1284
Sand, light, Big Lime (253).....	35	1319
Limestone, light, softer, Big Lime (253).....	33	1352
Limestone, light, dark, Big Lime (253).....	31	1383
Limestone, light, Big Lime (253).....	20	1403
Limestone, dark, Big Lime (253).....	4	1407
Limestone light, Big Lime (253).....	7	1414
Limestone, light, Big Lime (253).....	10	1424
Limestone, gray, Big Lime (253).....	11	1435
Limestone, dark, Big Lime (253).....	10	1445
Limestone, gray (oil show 1460-1463) Big Lime (253) .....	18	1463
Limestone, light, Big Lime (253).....	4	1467



Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Limestone, gray, dark, Big Lime (253).....	7	1474
Sand, dark, gray .....	8	1482
Limestone, dark, gray and pebbles (gas 1515) .....	35	1517
Limestone, dark, gray, pebbles and crystal rock .....	5	1522
Sand, pebble and crystal rock .....	4	1526
Sand, gray and limestone .....	6½	1532½
Total depth .....		1532½

## LOG No. 20.

Well at Saxton, ½ mile S. E. Saxton, between L. & N. and Southern R. R., 20 feet or more above railroad. Drilled by Clear Fork Oil and Gas Co. in spring of 1902.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale .....	130	130
Sandstone .....	30	160
Sandstone .....	10	170
Sandstone .....	10	180
Sandstone .....	30	210
Sandstone .....	35	245
Sandstone .....	30	275
Shale .....	20	295
Shale .....	5	300
Shale .....	30	330
Shale .....	50	380
Sandstone .....	45	425
Sandstone .....	35	460
Sandstone .....	35	495
Sandstone .....	30	525
Sandstone .....	30	555
Sandstone .....	30	585
Sandstone .....	25	610
Sandstone .....	25	635
Sandstone .....	20	655
Sandstone .....	20	675
Sandstone .....	15	690
Sandstone .....	15	705
Sandstone .....	15	720
Sandstone .....	15	735
Sandstone .....	10	745
Shale (cased at 747, 6¼" casing) .....	10	755

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale .....	55	810
Sandstone .....	30	840
Shale .....	55	895
Shale and sandstone (salt water 935).....	40	935
Sandstone .....	10	945
Sandstone (more water, rerimmed 8¾")....	15	960
Sandstone .....	10	970
Sandstone .....	15	985
Sandstone .....	10	995
Sandstone (8" hole to 1000, cased).....	10	1005
Sandstone .....	15	1020
Sandstone .....	20	1040
Sandstone .....	15	1055
Sandstone .....	10	1065
Sandstone .....	15	1080
Sandstone (oil show) .....	12	1092
Sandstone and shale .....	33	1125
Sandstone .....	30	1155
MISSISSIPPIAN SYSTEM		
Limestone .....	20	1175
Pink rock .....	35	1210
Shale, red .....	50	1260
Sandstone .....	40	1300
Limestone and shale .....	35	1335
Limestone and shale .....	35	1370
Shale and shell .....	30	1400
Shale and shell .....	25	1425
Limestone .....	25	1450
Limestone .....	25	1475
Limestone .....	30	1505
Limestone .....	25	1530
Shale and limestone .....	30	1560
Limestone .....	25	1585
Limestone .....	25	1610
Limestone .....	6	1616
Total depth .....		1616

## WELL LOG No. 21.

Steely, No. 1, lessor. Cumberland Bend Oil & Gas Co., lessee.  
 Location: 1 mile N. W. of Williamsburg, Whitley Co., Ky. Drilled:  
 1903. Drillers: E. C. and A. L. Disel.

Strata	Thickness	Depth
RECENT		
Sand, drift .....	35	35

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale .....	28	63
Coal .....	2	65
Shale .....	100	165
Sandstone .....	225	390
Coal .....	5	395
Shale .....	5	400
Sandstone .....	80	480
Shale .....	4	484
Sandstone, white (salt water at 503).....	106	590
Shale .....	60	650
Sandstone .....	50	700
Shale .....	80	780
Shale and shells .....	20	800
Sandstone .....	60	860
Shale .....	30	890
MISSISSIPPIAN SYSTEM		
Shale, pink .....	20	910
Shale and lime shells .....	90	1000
Limestone .....	70	1070
Total depth .....		1070

10" drive pipe 35 ft. 8" casing 484 ft. 6¼" casing at 591 feet. A lot of salt water at 503 ft.

#### WELL LOG NO. 22.

Steely No. 3, lessor. Cumberland Bend Oil & Gas Co., lessee  
 Location: About 1 mile N. W. of Williamsburg, Whitley County, Ky.  
 Drilled: 1903 by E. C. Disel.

Strata	Thickness	Depth
RECENT		
Sandstone, drift, gravel .....	30	30
PENNSYLVANIAN SYSTEM		
Sandstone, gray .....	5	35
Shale, black .....	105	140
Sandstone, gray .....	5	145
Shale .....	10	155
Sandstone, white .....	240	395
Coal .....	5	400
Sandstone, white .....	200	600
Shale, brown .....	30	630
Coal .....	2	632
Sandstone, gray .....	8	640
Sandstone, white .....	15	655
Shale .....	35	690

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, shells .....	70	760
Sandstone, gray .....	15	775
Sandstone, white .....	10	785
Sandstone, gray .....	12	797
MISSISSIPPIAN SYSTEM		
Limestone .....	5	802
Shale, black .....	10	812
Shale, pink .....	8	820
Total depth .....		820

Drive pipe 30 ft. 6¼" casing 600 ft. Little oil at 445 ft. Oil 775 ft.  
Williamsburg Oil Sand 760 to 797 ft.

## WELL LOG NO. 23.

Steely No. 6, lessor. Cumberland Bend Oil and Gas Co., lessee.  
Location: About 1 mile N. W. of Williamsburg, Whitley Co., Ky.  
Drilled: 1904 by E. C. Disel.

Strata	Thickness	Depth
RECENT		
Sand drift .....	35	35
PENNSYLVANIAN SYSTEM.		
Shale .....	10	45
Sandstone, gray .....	10	55
Shale .....	78	133
Coal .....	2	135
Shale .....	5	140
Sandstone, gray .....	10	150
Sandstone, white .....	180	330
Shale .....	5	335
Sandstone, white .....	45	380
Coal .....	5	385
Sandstone, white .....	195	580
Shale .....	10	590
Sandstone, white .....	40	630
Sandstone, gray .....	5	635
Coal .....	2	637
Sandstone, black .....	13	650
Shale, black, limestone .....	55	705
Shale .....	30	735
Sandstone, gray .....	10	745
Sandstone, white (oil 765) .....	55	800
Shale, black .....	11	811
Total depth .....		811

8¼" drive pipe 35 ft. 6¼" casing at 582 ft. Fresh water at 65 ft. Gas at 140 ft. Williamsburg oil sand top at 735 ft. Oil at 765 ft. Williamsburg oil, 765 to 775 ft.

#### WELL LOG No. 24.

Steely, No. 7, lessor. Cumberland Bend Oil & Gas Co., lessee. Location: 1 mile N. W. of Williamsburg, Whitley County, Ky. Drilled: 1905 by E. C. Disel.

Strata	Thickness	Depth
RECENT		
Sand, drift .....	30	30
PENNSYLVANIAN SYSTEM		
Shale .....	15	45
Sandstone .....	10	55
Shale, black .....	25	80
Shale .....	10	90
Shale, black .....	40	130
Coal .....	3	133
Sandstone, gray .....	22	155
Shale and limestone .....	10	165
Sandstone, white .....	160	325
Shale .....	10	335
Sandstone, white .....	45	380
Coal .....	5	385
Sandstone, white .....	205	590
Sandstone, black .....	5	595
Sandstone, white .....	40	635
Coal .....	2	637
Sandstone, gray black .....	23	660
Shale, limestone, shells .....	75	735
Sandstone, gray .....	10	745
Sandstone, white .....	56	801
Shale, black .....	15	816
MISSISSIPPIAN SYSTEM		
Shale, Pink .....	1	817
Total depth .....		817

8¼" casing drive pipe 35 feet. 6¼" casing at 661 ft. Oil at 670 ft. Oil at 715 ft. Williamsburg Oil Sand at 735 ft. Oil at 750 ft.

#### WELL LOG No. 25.

T. J. Perkins, No. 1, lessor. Cumberland Bend Oil & Gas Co., lessee. Near Williamsburg, Whitley county, Ky. Driller: E. C. Disel.

Strata	Thickness	Depth
RECENT		
Clay, yellow .....	20	20

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, black .....	10	30
Shale, blue .....	10	40
Shale, black .....	30	70
Sandstone, gray .....	30	100
Shale .....	30	130
Sandstone, gray .....	10	140
Shale .....	10	150
Sandstone, white .....	18	168
Coal .....	2	170
Sandstone, white .....	70	240
Shale .....	5	245
Sandstone, white .....	120	365
Shale .....	5	370
Coal .....	5	375
Sandstone, white .....	50	425
Shale .....	5	430
Sandstone, white .....	100	530
Shale .....	5	535
Sandstone, white .....	34	569
Shale .....	6	575
Sandstone, gray .....	5	580
Sandstone, white .....	85	665
Shale, shells .....	73	738
Sandstone, white .....	12	750
Shale .....	14	764
Sandstone, gray .....	2	766
Sandstone, white .....	89	855
Sandstone, black .....	5	860
Shale .....	5	865
Total depth .....		865

8¼" drive pipe 40 ft. 6¼" casing 570 ft. Water at 90 ft. Oil at 100 ft. Oil at 260 ft. Oil at 385 ft. Gas and oil at 605 ft. Oil and gas at 745 ft. Williamsburg Oil Sand at 764 ft. to 855 ft. Salt water at 842 ft.

#### WELL LOG No. 26.

Electric Light Co. No. 2, lessor. (Second lessor: W. B. Siler). Cumberland Bend Oil & Gas Co., lessee. (Second lessee: Iroquois Oil and Gas Co.) Location: Near Williamsburg, Whitley Co., Ky. Manager: E. C. Disel.



Strata	Thickness	Depth
RECENT		
Sand, drift .....	28	28
PENNSYLVANIAN SYSTEM		
Shale .....	102	130
Sandstone, white .....	120	250
Shale .....	5	255
Sandstone, white .....	115	370
Coal .....	5	375
Shale .....	5	380
Sandstone, white .....	193	573
Shale .....	7	580
Sandstone, gray .....	5	585
Sandstone, white .....	63	648
Coal .....	2	650
Shale and shells .....	116	766
Sandstone, white .....	82	848
Shale .....	23	871
Shale, blue .....	12	883
MISSISSIPPIAN SYSTEM.		
Shale, red .....	15	898
Shale, blue, black .....	85	983
Limestone, black .....	10	993
Limestone, broken .....	29	1022
Shale (caving) .....	17	1039
Limestone .....	36	1075
Shale .....	5	1080
Limestone, broken .....	5	1085
Limestone, hard .....	8	1093
Limestone .....	7	1100
Total depth .....		1100

8¼" drive pipe, 28 ft. 6¼" casing 575 ft. Pulled casing and reamed from 575 ft. to 971 ft., drilled 8" hole to 874 ft. and cased 6¼" casing, and part with 6½" casing. Oil at 645 ft. Williamsburg Oil Sand 766 ft., little oil at 770 ft. Oil at 805 ft. Salt water at 840 ft. Sandstone, "Salt Sand" 840 ft. to 848 ft. Williamsburg Oil Sand 766 ft. to 848 ft. Gas at 1,093 ft. More gas 1,100 ft. Well made 5 million cu. ft. of gas, 24 hours' open flow, 220 lbs. of rock pressure.

#### WELL LOG No. 27.

#### (PARTIAL RECORD)

John Foley, No. 1, lessor. The Kentucky Oil, Co. lessee. Location: Near Williamsburg, Whitley County, Ky. Drilled: Jan. 1917. Manager: H. H. Cripler.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, coal, shale .....	725	725
Sandstone, Williamsburg oil sand .....	160	885
Sandstone .....	40	925
Total depth .....		925

725 ft. 6 $\frac{5}{8}$ " casing and joint drive pipe 8 $\frac{1}{4}$ ". Top of Williamsburg Oil Sand 885 ft. Well driven about 125 ft. above river bottom.

#### WELL LOG No. 28.

B. H. Taylor, No. 1, lessor. Iroquois Oil & Gas Co., lessee. Location: About  $\frac{3}{4}$  mile N. W. of Williamsburg. Drilled in 1923. Driller: E. C. Disel.

Strata	Thickness	Depth
<b>RECENT</b>		
Clay .....	2	2
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, hard, shelly .....	23	25
Shale .....	225	250
Sandstone, white .....	275	525
Coal .....	5	530
Sandstone, white .....	178	708
Sandstone, gray .....	80	788
Shale, shells .....	118	906
Sandstone, white .....	110	1016
Shale .....	57	1073
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, white .....	12	1085
Shale .....	25	1110
Limestone .....	52	1162
Shale (caved considerably) .....	10	1172
Limestone, broken .....	28	1200
Limestone, soft .....	25	1225
Limestone .....	68	1293
Limestone .....	9	1302
Total depth .....		1302

19 ft. drive pipe 2 ft. Cased 6 $\frac{1}{4}$ " at 708 ft. Williamsburg Oil Sand 906 ft. to 1,016 ft. Show oil at 908 ft. Second oil show at 1022 ft. Gas at 1293 ft. Set 4 $\frac{7}{8}$ " liner from 1,032 ft. to 1,240 ft. to shut off cave and finished well with 4 $\frac{7}{8}$ " hole.

## WELL LOG No. 29.

(PARTIAL RECORD)

G. W. Rains, No. 1, lessor. Kentucky Oil Co., lessee. Location:  
Near Williamsburg, Whitley County, Ky. Manager: H. H. Cripler.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal .....	754	754
Sandstone "oil sand" .....	70	824
Shale .....	61	885
Sandstone .....	60	945
Shale .....	15	960
MISSISSIPPIAN SYSTEM		
Limestone .....	10	970
Shale, hard, pink .....	35	1005
Limestone .....	20	1025
Shale .....	5	1030
Limestone .....	30	1060
Shale .....	30	1090
Limestone, blue .....	15	1105
Shale .....	55	1160
Limestone, white .....	365	1525
Limestone .....	5	1530

6¼" casing at 745 ft. Gas at 1,302 ft., about 250,000 cu. ft.

## WELL LOG No. 30.

Log of well drilled by T. J. Langdon on the Mount Morgan Coal  
Company farm, near Williamsburg, Ky., Whitley county. Commenced:  
Feb. 2, 1923. Completed: March 5, 1923.

Strata	Thickness	Depth
RECENT		
Soil .....	28	23
PENNSYLVANIAN SYSTEM		
Shale .....	22	50
Sandstone .....	25	75
Shale .....	35	110
Sandstone .....	40	150
Shale .....	50	200
Sandstone .....	25	225
Shale .....	25	250
Sandstone .....	50	300
Shale .....	150	450
Sandstone .....	190	640
Shale .....	1	641
Sandstone .....	374	1015
Shale .....	85	1100

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone .....	215	1315
Shale .....	5	1320
MISSISSIPPIAN SYSTEM		
Limestone .....	15	1335
Limestone .....	49	1384
Shale .....	14	1398
Limestone .....	42	1440
Shale .....	5	1445
Limestone .....	55	1500
Sandstone .....	15	1515
Limestone .....	55	1570
Sandstone .....	5	1575
Limestone .....	105	1680
Shale .....	5	1685
Sandstone, hard .....	17	1702
Total depth .....		1702

Note: Cased  $8\frac{1}{4}$  at 41 feet, and  $6\frac{5}{8}$  at 828 feet.

#### WELL LOG No. 31.

John M. Taylor, No. 1, lessor. Piney Oil and Gas Co., lessee.  
 Location:  $\frac{3}{4}$  of a mile west of Williamsburg, Whitley county, Ky.  
 Commenced: Dec. 1, 1922. Completed: Mar. 5, 1923. Ensslin & Ensslin, Drillers.

Strata	Thickness	Depth
RECENT		
Soil .....	1	1
PENNSYLVANIAN SYSTEM		
Shale, sandstone, shelly limestone.....	74	75
Coal .....	2	77
Shale, sandstone, lime shells.....	41	118
Sandstone "Water sand" .....	22	140
Shale .....	95	235
Sandstone .....	160	395
Coal .....	3	398
Sandstone .....	184	582
Shale .....	23	605
Sandstone, oil show 672 ft.....	72	677
Shale .....	57	734
Sandstone .....	47	781
Shale .....	118	899
Sandstone .....	12	911
Shale .....	13	924
Sandstone, oil show 929.....	10	934

## MISSISSIPPIAN SYSTEM

Limestone .....	7	941
Shale, "Red Rock" .....	4	945
Shale .....	3	948
Limestone .....	33	981
Shale, shelly limestone .....	36	1017
Shale, pink .....	35	1052
Shale, shelly limestone .....	35	1087
Limestone, black .....	28	1115
Shale .....	5	1120
Limestone, black .....	50	1170
Shale .....	5	1175
Limestone, broken .....	5	1180
Limestone .....	26	1206
Shale, cavey .....	11	1217
Limestone .....	15	1232
Shale, "Pencil Cave" .....	3	1235
Limestone .....	215	1450
Total depth .....		1450

Note: Gas pay from 1,372 to 1,376. Water at 140 feet. Set 30 joints 6% casing, 605-677; total casing 599 feet.

## WELL LOG No. 32.

E. S. Moss, No. 1, lessor. Whitley Oil and Gas Co., lessee. 1902. Secondary lessee: Iroquois Oil and Gas Co. Location: Just below L. & N. R. R. bridge on North bank of Cumberland River,  $\frac{1}{2}$  mile from Williamsburg, Whitley county, Ky.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal .....	425	425
Sandstone .....	25	450
Sandstone .....	316	766
Sandstone "Oil Sand" .....	53	819
Shale, hard, and shells .....	81	1000
MISSISSIPPIAN SYSTEM		
Limestone .....	55	1055
Shale .....	5	1060
Limestone "Gas sand" .....	33	1093
Limestone .....	7	1100

Drilled to 435 by 1st lessee, 1902, and oil flowed from 8" hole without being cased. Iroquois Oil Co. drilled to Williamsburg oil sand and shot in Williamsburg oil sand, then later drilled to Williamsburg gas sand, Dec., 1920.

6 $\frac{1}{4}$ " casing 585 ft. Gas 1,093-1,095 ft. Well made 4 million.

## WELL LOG No. 33.

## (PARTIAL RECORD)

E. S. Moss, No. 2, lessor. Iroquois Oil and Gas Co. Lessee. Location: On bluff about 125 ft. above river bottom about  $1\frac{1}{4}$  miles north of town across Cumberland River from well No. 4, on the Steely farm. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal .....	885	885
Sandstone "Oil sand" .....	25	910
Sandstone .....	25	935
Total depth .....		935

$8\frac{1}{4}$ " drive pipe 35 ft.  $6\frac{1}{4}$ " casing 715 ft. First oil at 892 ft. Second oil at 904 ft. to 910 ft.

## WELL LOG No. 34.

C. A. Moss No. 1, lessor. Iroquois Oil & Gas Co., original lessee; Esmaeldra Oil Co., secondary lessee. Location:  $3\frac{1}{2}$  acres on river bluff, about  $1\frac{1}{4}$  miles north of Williamsburg, about 125 ft. above river bottom, Whitley County, Ky. Commenced: March 9, 1917. Completed: April 18, 1917, in pink shale. Recommenced drilling June 1917. E. C. Disel drilled into gas sand for Esmaeldra Oil Co.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal .....	250	250
Sandstone, white .....	260	510
Coal .....	5	515
Sandstone .....	200	715
Sandstone .....	175	890
Sandstone, "Oil sand" .....	28	918
MISSISSIPPIAN SYSTEM		
Shale, pink .....	9	927
Sandstone and shale .....	193	1120
Limestone "Gas sand" .....	219	1339
Limestone "Gas sand" .....	93	1432

$8\frac{1}{4}$ " casing drive pipe.  $6\frac{1}{4}$ " casing 715 ft. Gas at 1,339 ft. about 50,000 cu. ft. Some oil.

## WELL LOG No. 35.

## (PARTIAL RECORD)

E. S. Moss No. 1, lessor. lessee. Location: On bluff across the river from the Steely farm, about  $1\frac{1}{2}$  miles north of Williamsburg, Whitley Co., Ky. Drilled by R. H. Parker, and Harlie



Burkett, Findlay, Ohio. Completed: Jan. 1, 1908. Authority: E. C. Disel.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, shale, coal .....	894	894
Sandstone "Oil Sand" .....	35	929
Shale .....	11	940
Total depth .....		940

8¼" drive pipe 30 ft. 6¼" casing 715 ft. Williamsburg oil sand 894 to 929 ft. Well made 35 bbls. of oil first 18 hours.

#### WELL LOG No. 36.

##### (PARTIAL RECORD)

Rhoda Siler, No. 1, lessor. Cumberland Bend Oil & Gas Co. Location: Just across Cumberland River from the mouth of Clear Fork River on river bottom, Whitley County, Ky. Driller: James Laugh-ton.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, shale, coal .....	705	705
Sandstone "Oil sand" .....	56	761
Sandstone and shale .....	359	1120
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, sandstone, gas .....	280	1400
Total depth .....		1400

6¼" casing at 685 ft. Gas at 1,387 ft.

#### WELL LOG No. 37.

##### (PARTIAL RECORD)

C. A. Moss, No. 1, lessor. Farm No. 1, Southeastern Oil Co., lessee. Location: About 2 miles S. W. of Williamsburg, Whitley Co., Ky., near where the carbon plant is now located. Contractor: H. A. Greenlee. Manager: E. C. Disel.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil, sand and gravel (drive pipe).....	42	43
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, shale, coal .....	743	885
Sandstone, "Oil sand" .....	40	925

This is about 20 feet above river bottom. 8¼" drive pipe 42 ft.

## WELL LOG No. 38.

## (PARTIAL RECORD)

E. S. Moss, No. 2, lessor. Whitley Oil Co., lessee. (Secondary lessee, Iroquois Oil and Gas Co.) Drilled in 1902 by first lessee, and 1920 by last lessee. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal .....	800	800
Sandstone, shale .....	200	1000

## MISSISSIPPIAN SYSTEM

Limestone "gas sand" .....	196	1196
6¼" casing 435 ft. 4⅞" 565 ft. 4⅞" 800 to 1,196 ft. Gas at 1,183 ft., about 500,000 cu. ft. with 275 lbs. of rock pressure.		

## WELL LOG No. 39.

## (PARTIAL RECORD)

Joe King, No. 1, lessor. Whitley County Oil Co., lessee. Location: About 1½ miles north of Williamsburg, Whitley county, Ky. Drilled by E. C. Disel, with standard big well about 120 feet above river bottom. Commenced: Dec. 5, 1916. Completed: Jan. 5, 1917.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal .....	250	250
Sandstone, white .....	260	510
Coal .....	5	515
Sandstone and shale .....	235	750
Coal .....	2	752
Sandstone and shale .....	148	900
Sandstone "oil sand" .....	37	937
Limestone .....	13	950

Total depth .....	950
-------------------	-----

8¾" drive pipe 32 ft. 6¼" casing 722 ft. Williamsburg Oil Sand 900 to 937 ft. Little oil and gas at 950 ft.

## WELL LOG No. 40.

R. N. Adkins, No. 1, lessor. Location: 1½ miles S. W. Williamsburg, on 1st right-hand branch of Briar Creek, Whitley County, Ky. Production: Gas. Completed: 1920. Casing head elevation: 1042 A. T. Structural position: Nose of anticline, south flank near crest. Authority: C. E. Disel, Williamsburg, Ky.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil .....	5	5
Sandstone .....	85	90

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale .....	175	265
Sandstone .....	162	427
Shale and coal .....	3	430
Sandstone .....	163	593
Shale (cased 600 6¼" casing) .....	32	625
Sandstone .....	115	740
Shale .....	10	750
Sandstone .....	55	805
Shale (coal due at 809) .....	60	865
Sandstone .....	35	900
Shale .....	23	923
Sandstone (oil) .....	20	943
Sandstone, broken .....	22	965
Shale .....	13	978
MISSISSIPPIAN SYSTEM		
Shale, pink (Mauch Chunk) .....	72	1050
Shale .....	50	1100
Limestone .....	10	1110
Shale .....	45	1155
Limestone (Big Lime) .....	25	1180
Shale .....	5	1185
Limestone (Big Lime) .....	40	1225
Shale .....	5	1230
Limestone (gas 1365) .....	135	1365
Limestone (more gas at 1370) .....	19	1384
Total depth .....		1384

#### RECAPITULATION OF SELECTED LIST OF WELL RECORDS OF WHITLEY CO., KY.

Lessor	Location	Depth
(1) J. P. Sharp .....	Rockhold Station .....	2230
(2) Williamsburg Water Co....	Williamsburg .....	128
(3) Perkins .....	Williamsburg .....	375
(4) Nelson No. 1 .....	1½ mi. S. E. Williamsburg....	826½
(5) Nelson No. 2 .....	Williamsburg (?) .....	871
(6) Electric Light Co. (partial record) .....	Williamsburg .....	826
(7) Sutton .....	1 mi. S. W. Williamsburg.....	975
(8) G. W. Rains (partial R.)..	Near Williamsburg .....	1381
(9) G. W. Rains No. 3.....	½ mi. S. E. Williamsburg.....	1532½
(10) Steely No. 2 .....	1 mi. N. Williamsburg.....	862

RECAPITULATION OF SELECTED LIST OF WELL RECORDS OF  
WHITLEY COUNTY, KY.—Continued.

Lessor	Location	Depth
(11) Steely No. 4 .....	1 mi. N. Williamsburg.....	800
(12) Steely No. 5.....	1 mi. N. Williamsburg.....	804
(13) Steely No. 8.....	1 mi. N. Williamsburg.....	2170
(14) Unknown .....	Mouth of Clear Fork.....	1530
(15) S. M. Brown No. 1.....	.....	1820
(16) John Foley No. 1.....	$\frac{3}{4}$ mi. W. Williamsburg.....	3350
(17) Rose No. 1 .....	$1\frac{1}{2}$ mi. W. Williamsburg.....	1305
(18) Bapt. Educa. Soc. No. 1....	1 mi. N. Dog Slaughter Ck....	1580
(19) H. M. Young No. 1.....	13 mi. N. W. Williamsburg....	1201
(20) R. N. Adkins No. 1.....	$1\frac{1}{2}$ mi. S. W. Williamsburg....	1384
(21) Unknown .....	$\frac{1}{2}$ mi. S. E. Saxton .....	1616

NOTE.—About 40-45 wells have been drilled in Whitley County, the records of many of which are not available.

## STRUCTURAL GEOLOGY

The principal structural feature of this region is the Williamsburg anticline. It adjoins on the southeast the lowest structural region in the eastern Kentucky coal basin—the eastern Kentucky geo-syncline. The Williamsburg anticline thus exhibits



NORTH FLANK WILLIAMSBURG ANTICLINE

This outcrop of sandy Pottsville shales is on the Nicholson Hill road below Williamsburg. The dip is about 3 degrees to the northeast.

a rather thick sequence in the lower Pottsville. Though both the eastern Kentucky geo-syncline and the Williamsburg anticline have a northeast-southwest trend, they are not regarded as complementary structures or of similar time origin. Elevations placed on the Lily coal show the Williamsburg anticline to be a doming structure rising to elevations of about 1,130 feet (Lily Coal) in the Hominy Dome on the headwaters of Hominy Creek, Beck's Creek and Rough Shoal Branch on the north and west, and Briar and Paint Creeks on the south and east. The main anticlinal structure plunges rapidly to the east, and elevations varying from 970 to 1,110 feet are common in the vicinity of Williamsburg townsite. A plunging syncline, here designated as the Brown's Creek syncline exhibiting elevations ranging from 1,020 to 1,120 feet (Lily Coal) bound the Williamsburg anticline on the north. The eastern Kentucky geo-syncline may be regarded as the structural boundary on the south and southeast.

An examination of the Williamsburg anticline reveals two pronounced terraces and one dome, the latter of which has already been referred to. The lowest of these terraces occurs just east of the Cumberland river, and the uppermost of the terraces occurs just west of the Cumberland river underneath the town of Williamsburg. These features are indicated on the structural map, scale 1 inch equals one mile, keyed the Lily coal which has been executed for this region. A copy of this structural oil and gas map is included within this volume as a part of this report.

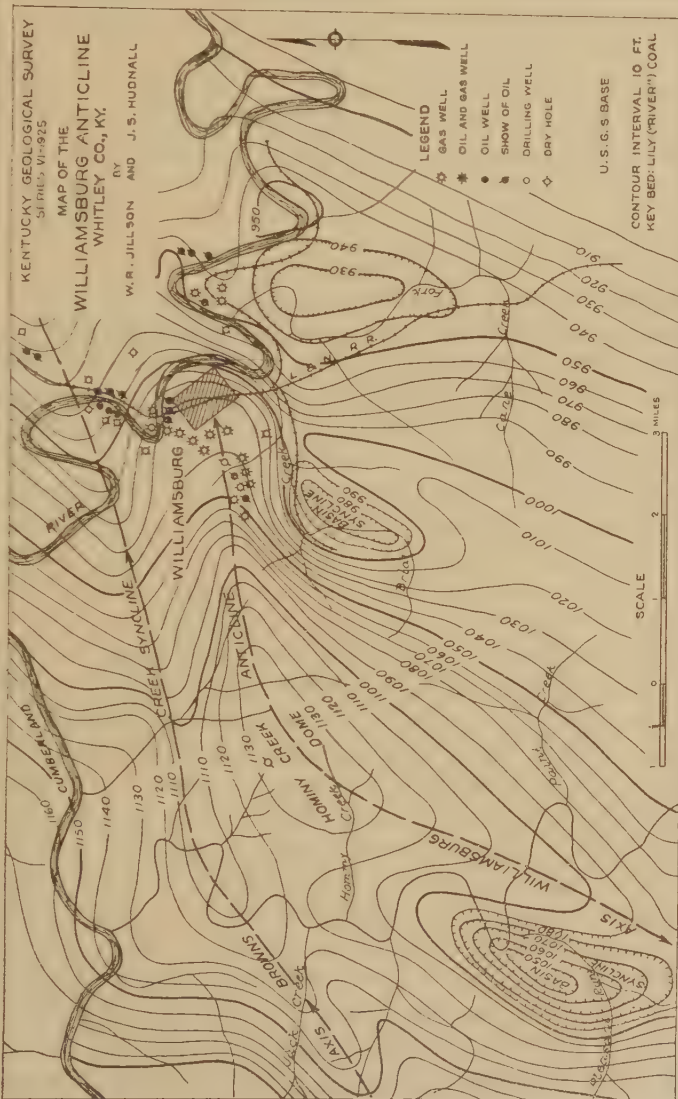
An investigation of the transverse axial figure of the subsurface structure of the region reveals the fact that there is a much larger and older anticline present in the sediments of Mississippian age than the one which is seen at the surface in the Pottsville series. In other words, the Mississippian rocks below Williamsburg are folded into a very pronounced anticline, which may have taken the form of a low island during the Mauch Chunk period. The Pennsylvanian sediments which are deposited on the top and flanks of this island are much thinner than those set down more remotely to the north and south of Williamsburg. Thus the distance from the Lily coal (Pottsville) to the top of the red rock (Mauch Chunk) is 893 feet, on the top of the Williamsburg anticline, while the same interval is 1,100 feet at Saxton, ten miles of Williamsburg. The same interval be-



KENTUCKY GEOLOGICAL SURVEY  
S. H. H. S. VI-925

MAP OF THE  
WILLIAMSBURG ANTICLINE  
WHITLEY CO., KY.

BY  
W. R. JILLSON AND J. S. HUDNALL



STRUCTURAL GEOLOGY OF THE WILLIAMSBURG ANTICLINE





tween the Lily coal (Pottsville) and the red rock (Mauch Chunk) is 1,000 feet at Rock Hold, a point approximately eight miles northeast of Williamsburg.

The axis of the subsurface structure is, therefore, almost east and west, being a few degrees north of west. The subsurface structure being much larger than the surface structure, which in itself is conspicuous, is considered of major importance in all future drilling. Oil and gas operators, by taking this fact into consideration, can greatly assist in outlining this subsurface structure more definitely.

#### OIL AND GAS SANDS

There are several bottom horizons which may be regarded as possible oil and gas "sands" in the Williamsburg region. The shallowest of these is the "Williamsburg sand," now producing green crude oil from 5 wells (gravity 37° Baume av.) on the E. N. Steely and other tracts in the vicinity of the town from which it derives its name. The "Williamsburg" sand is found at a depth varying from 750 to 850 feet, occurring in the basal Pottsville (Pennsylvanian), immediately above the Mauch Chunk (Mississippian). The "pays" usually occur between black fissile shales a few feet in thickness.

The "Williamsburg sand" correlates with the "Epperson sand" of Knox County and the "Pike sand" of the Beaver Creek section of Floyd County. The Williamsburg sand as a unit is usually about 100 feet thick, but the "pay" is only a fraction of this, averaging from 10 to 25 feet, and generally broken with shale streaks. The "sand" is a coarse silica sand, and has a rather large capacity for oil. Tests made by the U. S. Geological Survey upon samples furnished by the writer from the E. N. Steely lease gave a pore space of 12.4% by volume. It also presents the quality of long life, the Steely wells having produced oil continuously since 1902. The oil production is loaded into tank cars on the Louisville and Nashville railroad by the Cumberland Pipe Line Co. and routed through to the north. The total oil production in the Williamsburg sand is now reduced from a rather considerable figure to approximately 175 barrels per month.

In the wells which have been drilled in the vicinity of Williamsburg, the "Maxon" sand (Mauch Chunk) is not recognized as an oil and gas producer of commercial importance. The

Maxon is sometimes present in the record, but quite often it is missing. In spite of this fact, about thirty-five miles northwest of Williamsburg, where it outcrops, it is frequently well developed, and prompts the suggestion that somewhere in this



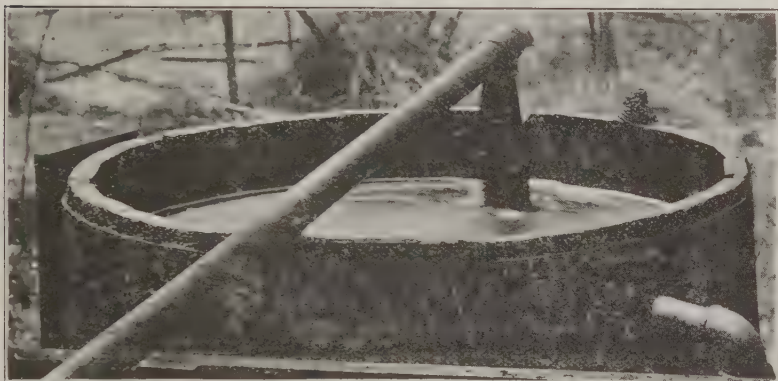
Pump House Steely Lease.

region it may some time be found to be an important oil "sand." The "Maxton sand" is well developed where it is brought up by the Pine Mountain fault near High Cliff, Tennessee, twelve miles southeast of Williamsburg, and may, therefore, be expected to occur at least on the outer flanks of the Williamsburg anticline, in which location it should be anticipated by the driller. It is an oil and gas producer of importance in the Barbourville (Knox County) and Beaver Creek (Floyd County) oil and gas fields a few miles to the northeast. It may be regarded as a distinct possibility in this field.

The next lower oil and gas producing formation definitely recognized in the Williamsburg vicinity is the "Big Lime" (Chester), which has been developed to a considerable extent in this vicinity. It has been pierced by more than a dozen wells. The "Big Lime" generally shows gas when drilled through on structural positions, and 9 wells are now producing a conservative 12,000,000 cubic feet daily open flow. Three of these, (1) the W. S. Siler No. 1, (2) the R. N. Adkins No. 1 and (3) the J.

K. Rose No. 1, produced over 3,500,000 cubic feet per day open flow apiece when first gauged.

A comparison of these larger gasers with others of very moderate production and occasional dry holes essentially in off-



Settling Tank Steely Lease.

set, leads to the conclusion that this calcareous formation is shot with joint planes—the “crevices” of drillers. These subsurface fissures probably developed into a well defined geometrical pattern, are undoubtedly intercommunicating and widely ramifying. Thus conceived, they would form an almost ideal gas reservoir, though which under certain fortuitous circumstances of drilling might be rather easily and quickly exhausted. Evaluated on a basis of its known gas production the “Big Lime” is considered the most important prospective “gas sand” in this region. In lower structural positions, it may also be an oil possibility, as petroleum is now being produced from it in paying quantities 30 miles to the northwest of Williamsburg in eastern Pulaski County, Ky.

There occurs in the Waverly series below the “Big Lime” a sandstone, which is possibly a correlative of the “Big Injun sand.” This sand has shown gas in a few wells, and is worthy of consideration by operators, though it is not shown to be a producer of petroleum in this region. It should be encountered at a depth of approximately 1,500 feet. The Beaver sand (New Providence-Mississippian), productive of both oil and gas in

Wayne County, 35 miles west of Williamsburg, is not recognized by drillers in this Whitley County field.

Dropping stratigraphically below the Chattanooga (Devonian) black shale which is about 150 feet thick in this region, the Corniferous limestone (Devonian) is encountered. This is the large oil producer of the Estill-Lee-Powell-Wolfe region. It is not regarded as a commercial oil and gas possibility in this field because of its extreme depth—about 1950 feet. Beneath it in succession will be found the Niagaran (Silurian), which is also known to produce at a number of points in eastern Kentucky, the “Sunny Brook” (Cincinnatian) and the “Trenton” (Mohawkian). These three deep “sands” are not regarded as of commercial importance in this field, the opinion being based upon drilling experience elsewhere in Kentucky at this depth. In the vicinity of Williamsburg, it may be logically inferred that regional metamorphism at a depth of 2,000-3,000 feet below the surface would be greatly increased as compared to that found in the shallow sands, due to the close proximity of the Pine Mountain over-thrust fault.

The principal unrecovered oil body of the Williamsburg field is thought to occur in the “Williamsburg sand.” The “Big Lime” gas sand underlying is also considered important, with the distinct possibility of securing production from the “Maxton sand” and “Big Injun sand” in some places yet undrilled. From the standpoint of present knowledge, the “Williamsburg sand” and the “Big Lime sands” will be the principal oil and gas producers.

#### OIL AND GAS DEVELOPMENT

Drilling in the Williamsburg field has been sporadic since the first well, the E. S. Moss No. 1, was drilled to a depth of 425 feet on the Cumberland river just north of Williamsburg in 1902 by the Whitley Crude Oil Company, a local development company. This well produced oil and flowed with a flush production reported to have been between ten and fifteen barrels natural. Following this strike, eight additional wells were drilled by the Cumberland Bend Oil Company in 1902 on the E. N. Steely and adjoining farms north of Williamsburg and west of the river, oil production having been secured from the “Williamsburg sand.” These wells started in with natural production ranging



from two to five barrels. When shot, they produced between thirty-five and fifty barrels each. A characteristic analysis of oil taken from the Steely lease by the writer is given herewith.

#### PETROLEUM ANALYSIS

Laboratory No. G-4077—Petroleum, labeled "Sample: Green crude oil (fresh pumped). Lessor: E. N. Steely. Lessee: Iroquois Oil & Gas Co. Locality: 1 mi. N. of Williamsburg, Whitley Co., Ky. Horizon: Williamsburg sand (Pottsville). Coll. W. R. Jilson, State Geologist. Date: 5-10-22." Sample, a fairly thin, green oil; dark brown by transmitted light. Contains some sediment, all of which did not settle. Received from W. R. Jilson, May 12, 1922.

#### ANALYSIS

Specific gravity 0.8505, equivalent to 34.6° B.

	Per Cent by Volume
Distilled below 150° C. (302° F.), gasoline fraction.....	16.3
Distilled 150 to 300° C. (302-572°F.), kerosine fraction.....	32.6
Green-brown tar .....	49.8
Water .....	0.4
Loss .....	0.9
Total .....	100.0
Sulfur .....	

Began to distill at 55° C. (131° F.)

ALFRED M. PETER, Chief Chemist

(Analysis by A. M. Peter.)

Lexington, Ky., June 7, 1922.

Various other wildcat wells were drilled by a number of small companies in 1903 and 1904. The Joe Sutton well was drilled in 1903. In 1912 the Disel Oil and Gas Company took over the properties of the Cumberland Bend Oil and Gas Company and continued development. The E. S. Moss and C. A. Moss farms on the bluff were drilled in 1916 by the Whitley Crude Oil Company. In 1917 the Kentucky Oil Company secured and drilled the George Risner lease. In 1917 the Esmeralda Oil Company drilled the C. A. Moss to the line and got 150,000 cubic feet of gas. In 1919 the Iroquois Oil and Gas Company took over the Disel Oil and Gas Company, which at that time controlled the Steely production, and drilled six gas wells, which are now supplying Williamsburg with natural gas.



One or two other gas wells were drilled in by drilling deeper old shallow wells. In 1921, the Whitley Crude Oil Company started drilling the Joe Hamlin No. 1, at the head of Beck's Creek, on top of the Hominy Creek Dome on the Williamsburg



Tank House Steely Lease.

anticline. This company ran out of funds and, apparently unmindful of the important structural position they occupied, stopped drilling at a depth of 835 feet, about 130 feet above the sand. At the present time there are no other wells being drilled in this field.

#### NATURAL GAS PRODUCTION—SELECTED WELLS

G. W. Rains farm No. 2, drilled in 1917. Gas at 1,369 ft. Drilled to 1,381 ft. Gauged two million cubic feet. Gauged in 1921, 134,000 cubic feet. Two other small gas wells on this farm.

R. N. Adkins well drilled in April, 1920. Gas at 1,365 feet. Drilled to 1,380 feet. Gauged 3,500,000 cubic feet. In fall of 1921, gauged 2,952,480 cubic feet. Rock pressure 240 lbs.

J. K. Rose well drilled in July, 1920. Gas at 1,265 feet. Drilled to 1,305 feet. Gauged 3,500,000 cubic feet. In fall of 1921 gauged 3,000,000 cubic feet. Rock pressure 240 lbs.

E. S. Moss well No. 2, below railroad bridge. Drilled in October, 1920. Gas at 1,183 feet. Drilled to 1,196 feet. Gauged 500,000 cubic feet. Gauged in 1921, 500,000 cubic feet. Rock pressure 225 lbs.

E. S. Moss well below railroad bridge. Drilled in December, 1920. Gas at 1,093 feet. Drilled to 1,100 feet. Gauged 3,500,000 cu. ft. Gauged in 1921, 3,000,000 cubic feet. Rock pressure 225 lbs.

W. B. Siler or Electric Light Co., Well No. 2. Drilled in spring of 1921. Gas at 1,093 feet. Drilled to 1,100 feet. Gauged 4,000,000 cubic feet. Gauged in fall of 1921, 3,500,000 cubic feet. Rock pressure 230 lbs.

## OIL PRODUCTION

Complete data covering amount of oil produced in Whitley County for the time the field was opened are not available. The following figures based upon runs of the Cumberland Pipe Line Co. are accurate and outline the latter period of development and operation principally by the Iroquois Oil and Gas Co.

1919	Bbls.	Value
August .....	148.09	\$399.84
September .....	149.63	404.14
October .....		*
November .....	149.61	426.39
December .....	142.01	461.53
	589.39	\$1,691.90

1920	Bbls.	Value
January .....		
February .....	146.31	\$548.66
March .....	144.60	542.25
April .....	142.12	568.48
May .....	140.55	562.20
June .....	112.82	451.28
July .....		
August .....	140.37	561.48
September .....	148.39	630.65
October .....		
November .....	145.70	619.23
December .....		
	1,120.86	\$4,484.23

1921	Bbls.	Value
January .....	137.60	\$309.80
February .....	140.23	231.38
March .....		
April .....	150.00	292.50
May .....	141.37	226.14
June .....	140.26	126.23
July .....	150.05	135.05
August .....	149.82	164.80
September .....		

\*Dotted lines indicate no oil runs.

1921	Bbls.	Value
October .....	.....	.....
November .....	.....	.....
December .....	293.84	558.30
	1,303.17	\$2,044.20
1922	Bbls.	Value
January .....	.....	.....
February .....	.....	.....
March .....	.....	.....
April .....	.....	.....
May .....	149.75	\$321.96
June .....	.....	.....
July .....	.....	.....
August .....	.....	.....
September .....	115.50	190.58
October .....	.....	.....
November .....	.....	.....
December .....	.....	.....
Total .....	265.25	\$512.54
	Bbls.	Value
1919 .....	589.39	\$1,691.90
1920 .....	1,120.86	4,484.23
1921 .....	1,303.17	2,044.20
1922 .....	265.25	512.54
Grand total from Aug., 1919 to Sept., 1922, inclusive .....	3,278.67	\$8,732.87

## OIL AND GAS POSSIBILITIES

Based upon a delineation of the surface and subsurface structures, and the present and past production of the field, petroleum and natural gas are regarded as occurring in commercial quality and quantity in the "sands" already outlined beneath the Williamsburg anticline. Oil production is regarded as a certainty in the "Williamsburg sand" at a depth of about 800 or 850 feet, depending upon the surface altitude and location of the well. The best oil production is anticipated along the crest of the subsurface (Mississippian) anticline. Drilling positions to the west of present production are recommended for initial testing purposes.

In the "Big Lime sand" the Williamsburg anticline is regarded as a gas producer of possibly gigantic size. It is pointed

out that natural gas may also be secured from both higher and lower sands than the "Big Lime sand" at high structural positions on this anticline. The location of the Joe Hamlin No. 1 is on the crest of the surface dome of the Williamsburg anticline, and is a good testing location. This well should be drilled deeper and through the Big Lime "pay."

Other tests are recommended along the crest of the surface anticline, and also along a parallel line about a mile to the northwest, extending along what is regarded as the crest of the subsurface (Mississippian) anticline. The present gas production of the Williamsburg field totals about 12,000 feet open flow, and this is regarded as simply an index to the very much larger open flow which could be secured in this field. Rock pressure varies from 150 to 280 pounds. For further natural gas details concerning this region the reader is referred to pages 50 and 51 of "The Conservation of Natural Gas in Kentucky," 1922, by the writer.

An examination of 15 separate analyses of the coals of the Williamsburg area, all commercial seams being represented, shows that the fuel ratio is about 1.4 or 60% of fixed carbon, thus indicating that the regional metamorphosis, while high, has not been sufficient to preclude the possibility of commercial quantities of petroleum in the shallow sands, the occurrence of the faulted Pine Mountain slightly to the south notwithstanding. If additional proof were desired, the fact that commercial oil has been produced from the Steely wells at Williamsburg for 20 years would seem to set the question aside definitely.

While a number of tests located with geological precision will be required to fully outline the Williamsburg field, in planning such comprehensive development, it is certain that oil in commercial quantities, and large supplies of natural gas can be secured at depths ranging from 800 to 1,500 feet. These are regarded as mediumly shallow for the eastern coal field of Kentucky. Thus delineated the Williamsburg region is regarded as worthy of further prospecting for oil and gas. The convenience of the main line of the Louisville and Nashville railroad bisecting this region, coupled with an excellent graded road from Williamsburg to the heart of the undeveloped oil and





STEELEY NO. 5 WELL ON PUMP

This well and lease is owned and operated by the Iroquois Oil and Gas Co.

gas leases of the Jellico Creek region, will lower the cost of development and facilitate its completion.

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Gives oil production figures for Whitley County, years 1918, 1919, 1920 and a part of 1921.



1922

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Conservation of Natural Gas in Kentucky. John P. Morton Co., Louisville, Kentucky, pp. 50 and 51.

Brief statement of occurrence of Williamsburg Anticline, regional geology and oil and gas production.

Oil Field Stratigraphy of Kentucky. Ky. Geol. Survey, Series VI, Vol. III, pp. 705-716. Gives numerous well logs of Williamsburg region many of which are reproduced here.

Manuscript written Sept., 1922.

Revised August, 1925.



### III.

#### RESUME OF KENTUCKY'S MINERAL RESOURCES\*

Second in figure only to the total value of its agriculture, the producing mineral resources of Kentucky are the most important and valuable material asset of the state. Despite this fact, the citizen and his elected representatives have been slow



PRODUCING PETROLEUM IN WESTERN KENTUCKY

One of the important new oil fields of this State is located near Pellville in Hancock, Ohio and Daviess Counties. This view shows one "pumper" and a drilling on the S. V. Flowers lease in the Pellville pool in Ohio County.

to take advantage of the many advantages afforded by nature. Though oil was found by drilling processes in southern Kentucky over 100 years ago, and coal has been definitely known to occur in this state since 1750, no attempt to develop these and other associated minerals in Kentucky was launched on a broad scale until about 1890.

Within recent years the development of oil, gas, coal, fluor-spar and rock asphalt has proceeded by leaps and bounds, and has given a very great impetus to industry and prosperity throughout this state. Other minerals have been developed less rapidly. In 1916 Kentucky produced 1,144,750 barrels of crude oil, and this production increased in 1917 to over 3,000,000 barrels. In 1918 another million barrels were added, which increased the total value of the crude oil to \$8,906,422.00. In 1919

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<sup>1</sup>Presented before the Kentucky Educational Association Louisville Male High School, Tuesday, January 16, 1923. Revised September, 1925.

the apex of the volume of oil produced in Kentucky was reached, when 9,226,473 barrels valued at \$24,459,017.00 was produced. In 1920 the production of crude oil, due to a slump in price decreased to about 8½ million barrels. In 1921, Kentucky oil



HAZARD COAL FIELD, EASTERN KENTUCKY

This is a typical scene in the Eastern Coal Field. Many operations like this one of the Harvey-Jellico Coal Co. on the head of First Creek in Perry County make use of the double tippie and drift mine two separated properties at the same time.

production increased to 9,080,845 barrels and this volume, coupled with the mounting price of crude oil made 1921 the banner year for value—\$33,556,241.00, being the gross return to oil operators in the state of Kentucky. In 1922 the production of petroleum decreased to 8,889,303 barrels valued at \$17,532,766. Production slightly decreased to 8,087,250 barrels valued at \$15,189,916 in 1923. The past year, 1924, witnessed a still further decrease in the volume of Kentucky oil, 7,437,232 barrels being produced valued at \$14,418,982. With a depressed market, due to large production in the west, coupled with new refining methods, the immediate future for the oil industry in Kentucky appears to be unsettled and unattractive. Production will probably continue to decline.

The story of the coal development in this state is much similar, but the figures of value far exceed those of petroleum. In 1918 Kentucky produced 31,530,442 tons of coal which were valued at \$94,591,326. The production in 1919 decreased about a million tons, but in 1920 increased to 38,892,044 tons valued at \$159,457,380.00. In 1921, due to strikes and other causes

brought about by the depression, the production of coal in Kentucky dropped to 30,282,659 tons valued at \$81,460,352.00. At this time there were 641 mines operating in the state of Kentucky, controlled by 525 companies, employing a total of 49,790 men. In the year 1922 there were produced 42,134,175 tons of coal, which increased in 1923 to 43,149,962 tons and again in 1924 to 43,387,732 tons,<sup>1</sup> a greater amount than ever before in Kentucky. The value of this large production, due to a continued weak market, was only \$88,745,968.00 at the mines. Such a volume of production, however, has raised Kentucky from 5th to 4th place among the states producing coal in the United States. This state is now superseded only by Pennsylvania, first; West Virginia, second and Illinois, third.

During the past two years Kentucky's progress in coal development has been greatly handicapped by the general depression and reorganization effective in the industry throughout the country. In 1922 the nonunion fields of this state continued in full operation during the general bituminous strike and forced Kentucky during a portion of the year into first place among the coal producing states of the United States. This was indeed an unique, and not altogether unappreciated, national distinction. Further increases are anticipated for the coal industry in Kentucky, but these will undoubtedly be less rapid than during the past few years. Systemization, standardization and consolidation of mines resulting in more scientific operation with reduced overhead expenses seems to be the reasonable forecast for the immediate future.

The third mineral of great importance in Kentucky is fluorspar, a whitish or glassy-appearing mineral, principally found in Livingston, Crittenden and Caldwell Counties, in western Kentucky, and in Mercer, Woodford and Jessamine Counties in central Kentucky. The western field in connection with the deposits just north of the Ohio river in Illinois at Rosiclare, has recently been determined to be the greatest fluorspar field in the eastern United States, possibly the Union. Inasmuch as this mineral is essential to the modern manufacturer of steel, glass, aluminum and hydrofluoric acid, its future is assured.

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<sup>1</sup> Figures from State Department of Mines, Lexington, Kentucky.

In 1918, 87604 tons of fluorspar were produced in Kentucky. In 1919 this production, due to the stagnation in the steel industry, dropped to 33,928 tons. In 1920 it increased to 46,091 tons, and in 1922 again increased to 63,322 tons. In 1924 Ken-



#### AN IMPORTANT KENTUCKY INDUSTRY

View of the General Refractories Co. plant at Olive Hill, Carter County, Kentucky. The capacity of this plant is 100,000 bricks per day. Clays for pottery, brick and tile and fire-clays for fire bricks are of increasing value in Kentucky.

tucky fluorspar production dropped to 46,728 tons. The value of the 1918 production of fluorspar was \$2,069,185.00. Other years have been in proportion. The total value of but three minerals, coal, petroleum and fluorspar, for the three years, 1918, 1919 and 1920, for which figures are complete, amounted to \$401,251,701.00. This tremendous amount of wealth is a fair index of the importance of the developed and undeveloped minerals in Kentucky.

The rock asphalt industry as now developed in Kentucky began in 1916 and 1917 in Edmonson County on the Nolin river. Prior to this time a number of unsuccessful attempts to produce this material for road making purposes had been initiated and had failed. At the present time there are about six corporations and as many more in process of organization. It is estimated that the volume of production in 1924 was about 250,000 or 300,000 tons with a value of \$1,800,000.00 to \$2,300,000.00. The best deposits are confined to Edmonson, Grayson, Warren, Hardin and Breckinridge Counties, in western central Kentucky, though outcrops of undetermined commercial value have been noted



elsewhere. With a growing market, frequently under produced, the future for the rock asphalt industry in Kentucky appears to be very bright.

## RECENT MINERAL VOLUMES AND VALUES

### COAL PRODUCTION IN KENTUCKY.\*

	Volume	Value
1921 .....	30,282,659 tons	\$81,460,352.00
1922 .....	42,134,175 tons	127,037,000.00
1923 .....	43,149,962 tons	113,542,000.00
1924 .....	43,387,732 tons	88,745,968.00

### OIL PRODUCTION IN KENTUCKY.†

	Volume	Value
1921 .....	9,080,845 bbls.	\$33,556,241.00
1922 .....	8,889,303 bbls.	17,532,766.00
1923 .....	8,087,250 bbls.	15,189,916.00
1924 .....	7,437,232 bbls.	14,418,982.00

### FLUORSPAR PRODUCTION IN KENTUCKY

	Volume	Value
1921 .....	18,670.11 tons	\$360,146.42
1922 .....	63,322.20 tons	1,170,194.25
1923 .....	56,803.34 tons	1,181,509.47
1924 .....	46,728.07 tons	965,869.20

### NATURAL GAS PRODUCTION IN KENTUCKY.\*

	M. Cu. Ft.	Value
	Volume	
1921 .....	4,820,000	\$1,597,000.00
1922 .....	5,872,000	1,879,000.00

### CLAY PRODUCTION IN KENTUCKY.\*

	Volume	Value
1921 .....	35,591 tons	\$204,400.00
1922 .....	67,591 tons	270,858.00
1923 .....	102,195 tons	428,021.00

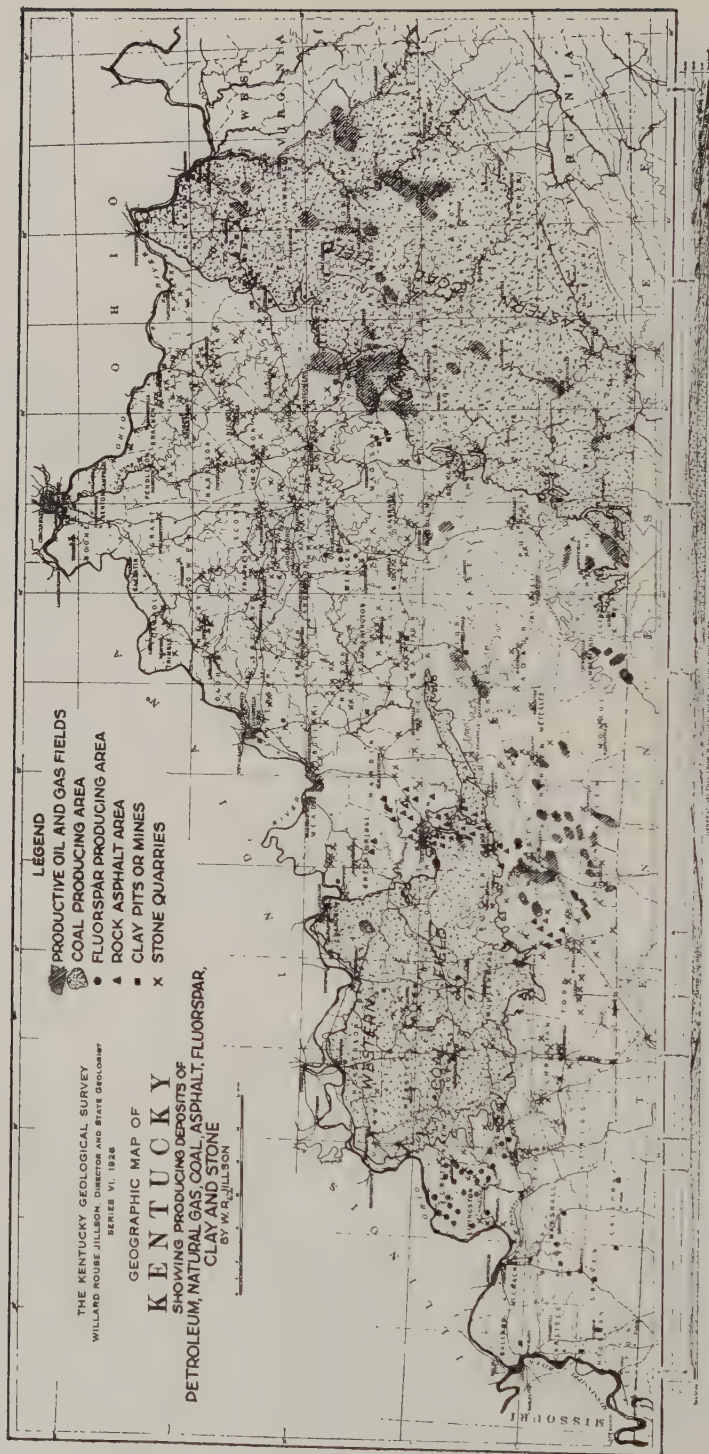
### STONE PRODUCTION IN KENTUCKY.\*

	Volume	Value
1920 .....	1,422,530 tons	\$1,756,176.00
1921 .....	1,573,750 tons	1,877,487.00
1922 .....	1,537,690 tons	1,853,851.00

\*Records U. S. Geol. Survey.

†Records Kentucky State Tax Commission.





MAP OF KENTUCKY INDEXING MINERAL RESOURCES

Besides the minerals just discussed in some detail, there are in the state of Kentucky in commercial or scientific quantities, about thirty other mineral resources which are partially developed. The most important of these are: Abrasives; Aragonite



HAULING WASHED WESTERN KENTUCKY FLUORSPAR

One of the factors that has greatly handicapped the fluorspar industry in Crittenden and Livingston Counties, Kentucky, has been primitive concentrating methods. Marion, Crayne and Mexico, are railroad loading points. No other mineral industry could exist today and employ wagon transportation.

(Ky. Onyx); Artificial Gas; Barite; Bituminous Rock; Calcite; Carbon Black; Cements; Clay (pottery, tile, brick, etc.); Coke (beehive and by-product); Copper; Gravel; Gypsum; Iron; Kaolin; Lead; Lime; Limestone; Manganese Ore; Marble; Mica; Mineral Fertilizer; Mineral Waters; Natural Gas; Ochre; Oil; Shale; Onyx; Phosphate Rock; Potash; Pyrites; Salt; Sand; Sandstone; Silver; Stone; Travertine; and Zinc.

Kentucky's mineral development has been greatly retarded in the past by a lack of interest on the part of the citizens of the state in the affairs of the Kentucky Geological Survey, whose primary function it is to discover and report upon the occurrence of the various minerals in the state. One of the fundamental necessities to all detailed geological work is an accurate base map, showing elevations of the surface above sea level. Kentucky is about one-half base mapped at present. There are about 60 of the 120 counties that are either entirely or partly without an accurate base map. These areas are more or less geological wildernesses. They are primarily the backward districts, the so-called "pauper counties."

During the past two years topographical base mapping has been at a standstill in Kentucky, due to lack of any appropriation for this work. Figured, however, at the rate base mapping was going forward up until 1924, at least 50 years will be re-



#### OPEN CUTTING KENTUCKY ROCK ASPHALT

The largest operations in this State, those of the Kentucky Rock Asphalt Company, the Natural Rock Asphalt Company (shown here) in Edmonson County, and the Ohio Valley Rock Asphalt Company in Hardin County employ open quarry methods. Drift mining has been employed in Grayson County with less success.

quired to complete this mapping in Kentucky. Many important mineral resources are known to occur in the unmapped portions of our state. Others which are not known or are undeveloped, undoubtedly also occur in these parts. While Kentuckians have been spending their time in idle and immaterial controversies, the states of West Virginia and Ohio, which have a similar topography and list of mineral and natural resources, have each completed a 100% mapping program. In the year 1925 all states adjoining Kentucky, with possibly the exception of one or two, have more base mapping completed than has Kentucky.

No federal lands exist in this state. Kentucky state lands are of very small extent. The farmers of Kentucky are the principal owners of its undeveloped mineral wealth. While there are now many of them eking out a frugal existence, the knowledge of the minerals on their homesteads would, in many instances, make them independent. Could the farmers of Kentucky be brought to see how closely their individual interest is bound up

with the mapping of their fields, streams and mineral deposits by the Kentucky Geological Survey the day of that great and new prosperity for this state, so frequently proclaimed, would be really at hand.



#### QUARRY IN MISSISSIPPIAN LIMESTONE

The stone industry is one of the largest in Kentucky. This large operation is located just east of Olive Hill in Carter County, Ky. Its capacity is 35,000 tons per day.







#### IV.

### COMPARATIVE VALUES OF KENTUCKY PETROLEUMS

Within recent years considerable interest has been manifested in the varying character of the petroleum produced in Kentucky. It has become apparent that a considerable difference in crude oils of this State is to be expected not only in widely separated districts, but within the same producing field. Very marked changes are also found in separate oil "sands," and frequently even in the same "sand."

Since it has now become the policy of practically all of the large oil purchasing agencies to grade their oil on a basis of specific gravity—paying the highest price for the light oils, and graduated lower prices for the heavier oils—operators are impelled to give considerable attention to this factor. The probable characteristic of the petroleum of a newly developing field is always of interest. In anticipating the quality of oils to be produced in new territory operators generally make use of oil produced nearby as an index. The procedure is justified on a basis of experience, though it is not entirely reliable.

There are presented herewith seventy-two analyses of petroleum samples taken from various producing fields in this State. Most of these specimens were collected by the writer in the course of field work which has extended over several years in Kentucky. Although generalities are of less value than actual analyses, it is apparent from an examination of the records herein given and much practical field experience that, (1) other things being equal deep oil "sands" wherever located are productive of the lightest oils, (2) the oldest oil "sands," geologically generally produce lighter oil than younger "sands," the difference being marked enough to merit attention even when all of the producing "sands" are of middle or lower Paleozoic age and (3) oil "sands" producing west of Cincinnati Arch are more inclined to a high percentage of sulphur than those of Eastern Kentucky.



It is apparent in summary that oil from the "Corniferous" (Devonian), of Lee County and the "Beaver" (Mississippian) of Wayne County are excellent gasoline producers. The "Berea" (Mississippian) of Lawrence County is a better oil however, where a larger lubricating fraction is desired. Oils from extremely shallow "sands" such as the Corniferous in Lincoln County (Floyd Pool) or Breathitt County (Ragland Pool) are usually found to be of low gravity, dark green to black in color, thick, viscous and frequently asphaltic. Typical Kentucky crude oils, however, taken from depths ranging from 800 to 1800 feet are generally fairly thin green oils, light to dark red or brown by transmitted light. "Amber" reddish yellow oils produced from stray "sands" in the lower Mississippian near the Allen-Barren-Warren county lines are the palest in color of any in this State. Kentucky does not, however, produce in commercial quantity any petroleum as light either in color or gravity as the "Berea" Cabin Creek oil of West Virginia.

Index to County source of petroleums and table showing detailed analyses prepared at various intervals during the last several years by Dr. A. M. Peter, State Chemist, Kentucky Agricultural Experiment Station, University of Kentucky, Lexington, Kentucky, follows:

## ANALYSES

Allen County .....	3
Barren County .....	2
Carter County .....	2
Clay County .....	2
Clinton County .....	2
Cumberland County .....	4
Elliott County .....	3
Hancock County .....	2
Johnson County .....	2
Lawrence County .....	13
Lee County .....	9
Lincoln County .....	2
Magoffin County .....	1
Monroe County .....	1
Owen County .....	1
Simpson County .....	6

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COMPARATIVE VALUES OF KENTUCKY PETROLEUMS 101

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Warren County .....	13
Wayne County .....	4
Total .....	72

No. G-3856—Petroleum, labeled "Green oil from the Cumberland Pipe Line at Ivyton, Magoffin County, Ky."

No. G-3893—Petroleum labeled "Dark brown crude oil from the Horace Floyd No. 4, owned by the Versailles Oil Company, four miles due east of McKinney, Lincoln County, Ky. Producing horizon, Onondaga limestone. March 23, 1920."

No. 3894—Petroleum, labeled "Dark brown crude oil from the Horace Floyd No. 7, owned by the Versailles Oil Company, four miles due east of McKinney, Lincoln County, Ky. Producing horizon, Onondaga limestone. March 23, 1920."

No. G-3912—Petroleum, labeled "Busseyville Oil & Gas Co., lessee. W. D. Owens, lessor. Near Busseyville. First producing well in Lawrence County, Ky. Berea oil."

No. G-3913—Petroleum, labeled "New Domain Oil and Gas Co. R. J. Peters No. 1, lessor. Near Louisa, Lawrence County. Berea oil."

No. G-3914—Petroleum, labeled "No. 3, Ohio Fuel Oil and Gas Co., lessee. Marion Herd, lessor, No. 1, near Yatesville, Lawrence Co. Berea oil."

No. G-3915—Petroleum labeled "Ophir Oil Co., lessee, No. 5. John Collinsworth, lessor, No. 5. Near Fallsburg, Lawrence Co. Berea oil."

No. G-3957—Petroleum, labeled "Big Blaine Oil & Gas Co., lessee. W. F. Conley, No. 2, lessor. Near Potters, Lawrence Co. Berea oil."

No. G-3958—Petroleum, labeled "Big Blaine Oil & Gas Co., lessee. F. M. Conley, No. 5, lessor. Near Potters, Lawrence Co. Berea oil."

No. G-3959—Petroleum, labeled "Kentucky-West Virginia By-Product Co., lessee. W. P. Dalton, No. 5, lessor. Near Potters, Lawrence Co. H. V. Tygrett. Berea oil."

No. G-3960—Petroleum, labeled "No. 4, Kentucky-West Virginia By-Product Co., lessee. Jesse Bernard, lessor, No. 18. Near Potters, Berea oil. Lawrence Co."

No. G-3461—Petroleum, labeled "Ohio Fuel Oil & Gas Co., lessee. W. B. Pfost, lessor, No. 1. Three miles southeast of Yatesville, Lawrence Co. Berea oil."

No. G-3962—Petroleum, labeled "No. 1, Ohio Fuel Oil and Gas Co., lessee. Minerva Diamond, lessor, No. 2. Three miles southeast of Yatesville, Lawrence County. Berea oil."

No. G-3963—Petroleum, labeled "Ohio Fuel Oil & Gas Co. Thomas H. Burchett, No. 2, lessor. Near Yatesville, Lawrence Co. Berea oil."

No. G-3964—Petroleum, labeled "Ohio Fuel Oil & Gas Co. Raish Blankenship, lessor. Near Busseyville, Lawrence Co. Berea oil."

No. G-3965—Petroleum, labeled "Ohio Fuel Oil & Gas Co., lessee. W. F. Auston No. 2, lessor. Near Potters, Lawrence Co. Berea oil."

No. G-3971—Petroleum, labeled "P. H. Holbrook, lessor, Union Oil and Gas Co., Keaton Fork, Johnson County line. From Red Bush, Ky. Aug. 26, 1920. Weir sand."

No. G-3973—Petroleum, labeled "Green crude oil from W. M. Offill, No. 1, Tygart's Creek, Carter Co., Ky. Onondago limestone."

No. G-4037—Petroleum, labeled "Crude oil from the Britt Gibson No. 1, Weir-Berea. Located near Roscoe P. O. on Middle Fork. Little Sandy River, Elliott County, Ky."

No. G-4038—Petroleum, labeled "Crude oil from the Gail Peters, No. 1, Weir-Berea. Located south of Isonville P. O. on Newcombe Creek, Elliott County, Ky."

No. G-4042—Petroleum, labeled "Kendall Williams farm, Johnson County, Ky."

No. G-4059—Petroleum, labeled "Crude oil from the J. C. Hunter, No. 1 well, Ohio Oil Co., lessee, Sandy Sook Anticline,  $\frac{1}{2}$  mile north-east of Sandy Hook, Elliott County Ky. May 12, 1921. Weir sand at 788 feet producing."

No. G-4165—Petroleum, labeled "Oil found on W. L. Ashland's farm, John Brown's farm, Pellville, Hancock County, Ky. Tank sample: Wells are between 500 and 700 feet deep. From wells 1, 2 and 3. Drilled in 1924, by Bert Thompson, contractor, Pellville, Ky."

No. G-4166—Petroleum, labeled "W. G. Payne, Syh Johnson, the Stewart heirs, farm near Reynolds Station, Hancock County, Ky. Tank sample. Wells from 500 to 700 feet deep. Drilled by the Ky. Oil Co., Pellville, Hancock Co., Ky. Composite sample from wells Nos. 21, 22, 23, 24, 25, 26, 27, 28 and 29."

No. G-3878—Petroleum, labeled "Green crude oil, freshly pumped sample, from Oskamp pool, Boyds creek, **Barren County, Ky.** Pay sand, Onondaga. Collected by W. R. Jillson, Nov. 3, 1919."

No. G-3896—Petroleum, labeled "Crude green oil from the Eva Duncan lease east of Freedom postoffice, **Barren County, Ky.** Oil horizon a stray sand 574 feet below the top of the black shale in the Ordovician limestone. Collected by W. R. Jillson, State Geologist, April 19, 1920."

No. G-3939—Petroleum, labeled "Beech Bottom Oil & Gas Co., lessee, No. 1. J. W. Selvedge, lessor, No. 1. On Spring Creek  $7\frac{1}{2}$  miles east of Albany, **Clinton Co., Ky.** First show of oil 1740 ft. Second show 1,763 ft. Third show 1,783 ft."

No. G-3940—Petroleum, labeled "Wood Oil Company, lessee. A. J. Roberts. No. 19, lessor. Elk Springs, 8 miles south of Monticello, **Wayne County, Ky.** Beaver sand 15 ft., 517 to 532 ft. Top black shale 538 ft."

No. G-3942—Petroleum labeled "Old Am. Oil Co., lessee. G. E. Edens, No. 1, lessor.  $1\frac{1}{2}$  miles N. E. of Burkesville, **Cumberland County, Ky.,**  $\frac{1}{2}$  mile from Cumberland River. Drilled to 800 ft. Oil at 279 ft."

No. G-3943—Petroleum labeled "Old Am. Oil Co., lessee. G. W. Bunchett, No. 1, lessor. Rocky Branch,  $1\frac{1}{4}$  miles N. W. of Burkesville, **Cumberland Co., Ky.** 600 ft. Quit 12-23-19."

No. G-3944—Petroleum, labeled "Greensburg Oil Co., lessee. Ed. Baker, lessor, No. 3, Little Renox Creek, 3 miles from Burkesville, **Cumberland Co., Ky.** Reported 1000 ft. deep."

No. G-3947—Petroleum, labeled "Southern Oil and Refining Company of Denver, Colorado, lessee. Rus Gilbert, No. 1, lessor. On Brush Creek,  $\frac{1}{2}$  mile from Cumberland River, 6 miles N. E. of Burkesville, **Cumberland County, Ky.** Trenton rock. Struck 8-9-20."

No. G-3948—Petroleum, labeled "C. E. Dougherty No. 2, Jim Kendrick, lessor No. 4, on Beech Hollow,  $3\frac{1}{2}$  miles N. E. of Monticello, **Wayne County, Ky.** Stray sand 415 to 425 ft. Depth 546 ft."

No. G-3949—Petroleum, labeled "Wood Oil Co., lessee, A. J. Roberts, lessor. No. 21 on Elk Springs, 8 miles south of Monticello, **Wayne Co., Ky.** Beaver sand 11 ft. from 506 to 517 ft. 521 top of black shale. 1 bbl. production."

No. G-3950—Petroleum, labeled "C. E. Dougherty, No. 1, Jim Hendrick, No 3, lessor, on Beech Hollow  $3\frac{1}{2}$  miles N. E. of Monticello, **Wayne Co., Ky.** Beaver sand 500 to 512 feet. Depth 514 ft. Production 12 bbl. Last 2 ft. sediment."

No. G-4072—Petroleum, labeled "Green crude oil. Lessor, James A. Flowers. Lessee, Beach Bottom Oil and Gas Co. Locality, Beech Bottom, **Clinton Co., Ky.** Collector, Adj. Gen. Jackson Morris. Oil sand, Trenton 1,769 ft. Well, Beech Bottom No. 1. Date Oct. 15, 1921."

No. G-3977—Petroleum, labeled "Henry H. Lawrence, average production from all wells on lease. Big Dipper Oil Co., lessee. In **Warren County** near Barren Co. line. Corniferous sand."

No. G-3981—Petroleum, labeled "O. M. Stringer, No. 5, lessor, Irvine J. Brown, lessee. On Sulphur, **Allen County.** Mixed Beaver and Corniferous."

No. 3982—Petroleum, labeled "Stringer Bros., No. 6, lessor. Irvine J. Brown, lessee. Sulphur Creek, **Allen County.** Corniferous sand."

No. G-3983—Petroleum, labeled "Angie McReynolds, lessee, **Allen Co., Ky.** Received Oct. 1, 1920."

No. G-3984—Petroleum, labeled "Tom Boyd, No. 2, lessor. Moore and McGlothlin, lessee. On Drake's Creek, 4 miles south of Franklin, **Simpson County.** Corniferous sand."

No. G-3985—Petroleum, labeled "John William Holcomb, No. 1, lessor. Green and Brown, lessee. One mile south of Hillsdale, **Simpson County.** Corniferous sand."

No. G-3986—Petroleum, labeled "Moore and McGlothlin, lessee. Tom Boyd, No. 2, lessor. On Drakes Creek 4 miles south of Franklin, **Simpson County.** Corniferous sand."

No. G-3987—Petroleum, labeled "Joe T. Harris, lessor. Blair and others, lessee. Located at Temperance, **Simpson County.** Corniferous sand."

No. G-3988—Petroleum, labeled "W. B. Uhls No. 1, lessor. Doyle and others lessee. One mile from Hillsdale, **Simpson County**. Corniferous sand."

No. G-3989—Petroleum, labeled "Claude Thomas, lessor, shallow sand. On Smallhouse pike, 6 miles south of Bowling Green, **Warren County**."

No. G-3990—Petroleum, labeled "Luther Conk, No. 1. Tri-State Oil & Gas Co., on Glen Lily pike, within city limits of Bowling Green, **Warren County**. Beaver sand."

No. G-3991—Petroleum, labeled "Ella Torrent No. 3, lessor. Stine, Johnson and Herstetter, lessee. Located  $3\frac{1}{2}$  miles west of Bowling Green on the Barren River pike, **Warren County**. Beaver oil."

No. G-3992—Petroleum, labeled "E. J. Miller, No. 1, lessor. E. J. Miller Oil and Gas Company, lessee.  $1\frac{1}{2}$  miles northwest of Bowling Green on Glen Lily pike, **Warren County**. Corniferous sand."

No. G-3993—Petroleum, labeled "Virgil Tabor, average of all wells. Chase and Irish, lessee. On Barren-Warren line. **Warren County**. Corniferous sand."

No. G-3994—Petroleum, labeled "West Whitney No. 1, lessor, Pittsburgh Oil & Gas Co., lessee. At Memphis Junction, **Warren County**. Beaver oil. In tank 2 days."

No. G-3995—Petroleum, labeled "On Porter pike. Fred Gott No. 3, lessor. Independent Producing Oil Company. Corniferous sand. 4 miles east of Bowling Green, on Barren River, **Warren County**."

No. G-3996—Petroleum, labeled "Briggs lease, No. 1, Bertram Development Company, on Glen Lily pike, 1 mile west of Bowling Green, **Warren County**. Corniferous sand."

No. G-3997—Petroleum, labeled "Bailey lease No. 1. Bailey Oil Syndicate, lessee. Shallow sand Beaver.  $5\frac{1}{2}$  miles south of Bowling Green, **Warren County**."

No. G-3998—Petroleum, labeled "F. Banch, No. 1, lessor. Tampa Ky. Oil Co., lessee. 6 miles north of Franklin on Simpson-Warren County line, **Simpson County**. Corniferous sand."

No. G-3999—Petroleum, labeled "Jake Moulder, average of all wells taken from tank. Swiss Oil Corporation, lessee. 14 miles east of Bowling Green, near Allen County line, **Warren County**. Corniferous sand."

No. G-4000—Petroleum, labeled "Hugh Potter No. 4. White and Moore. Beaver sand.  $5\frac{1}{2}$  miles south of Bowling Green, **Warren County**."

No. G-4001—Petroleum, labeled "Jake Moulder, No. 12, lessor. Swiss Oil Corporation lessee. 14 miles east of Bowling Green, near Warren-Allen line, **Warren County**. Corniferous sand."

No. G-4026—Petroleum, labeled "Seepage oil, **Carter County**. J. B. Patton's farm. Collected by W. R. Jillson."



No. G-4027—Petroleum, labeled "B. M. Smith, No. 4, lessor. Cumberland Land Petroleum Oil & Gas Co., lessee. On Big Sinking Creek, **Lee County**. Corniferous sand."

No. G-4028—Petroleum, labeled "Eureka Tract, No. 4, lessor. Southwestern Petroleum Co., lessee. At headwaters of Cave Fork, **Lee County**. Corniferous sand."

No. G-4029—Petroleum, labeled "Prewitt, Miller & Wells, lessor, No. 7. Petroleum Exploration Oil & Gas Co., lessee. Townsend Fork of Big Sinking Creek, **Lee County**. Corniferous sand."

No. G-4030—Petroleum, labeled "Eureka Tract, No. 25, Southwestern Petroleum Co., lessee. 1 mile south of Zachariah, **Lee County**. Corniferous sand."

No. G-4031—Petroleum, labeled "Rex Pyramid Oil & Gas Company, lessee, Martha Reynolds, No. 3, lessor. At mouth of Cave Fork of Big Sinking Creek, **Lee County**. Corniferous sand."

No. G-4032—Petroleum, labeled "Rex Pyramid Oil & Gas Co., lessee. H. Williams, No. 10, lessor. Mouth of Cave Fork of Big Sinking Creek, **Lee County**. Corniferous sand."

No. G-4033—Petroleum, labeled "Richard Nichols, No. 4, lessor. Torrent Oil & Gas Company, lessee, at Zachariah, **Lee County**. Corniferous sand."

No. G-4034—Petroleum, labeled "Maloney & Collins, lessee. W. T. Booth, No. 5, lessor. On Brushy Fork of Big Sinking Creek, **Lee County**. Corniferous sand."

No. G-4035—Petroleum, labeled "Arch Wilson, lessor, No. 3. Southwestern Petroleum Company, lessee. 1½ miles above mouth of Cave Fork of Big Sinking Creek, **Lee County**. Corniferous sand."

No. G-4108—Petroleum, labeled "Budd Kerr, No. 3, Kettle Creek, **Monroe County, Ky.** Collected by W. R. Jillson, Aug. 26, 1923."

No. G-4109—Petroleum, labeled "From well No. 1, E. Marcom, Willow Grove, **Clay County, Tennessee**. Collected by W. R. Jillson, Aug. 26, 1923."

No. G-4110—Petroleum, labeled "Arch Short, No. 1, lessor, Powell Oil Co., lessee. Short Hollow of Kettle Creek, **Clay County, Tennessee**. Collected by W. R. Jillson, Aug. 26, 1923."

No. G-4210—Petroleum, labeled "Near Wheatley, **Owen County, Ky.**, C. W. Reister farm. Depth 398-402 ft. Ordovician. Collected by W. R. Jillson, Dept., 1923."



COUNTY NAME	Magoffin	Lincoln	Lincoln	Lawrence	Lawrence	Lawrence
Laboratory No. ....	G-3856	G-3893	G-3894	G-3912	G-3913	G-3914
Specific gravity .....	.835	.876	.870	.830	.831	.820
Equivalent Baume .....	37.7°	29.8°	30.9°	38.7°	38.5°	40.7°
Distilled below 150° C. (302° F.) *	20.0	17.0	19.0	21.2	21.2	21.8
Distilled 150°-300° C. (302°-572° F.) **	31.0	24.3	24.0	33.0	33.0	32.5
Residue***	49.0	58.0	56.0	45.0	45.0	43.0
Loss .....		.7	1.0	.8	.8	2.7
Total .....	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....		.43	.46	.24	.22	.25
Began to distill at:						
Centigrade .....	65°	55°	53°	60°	60°	46°
Fahrenheit .....	149°	131°	129°	140°	140°	115°
COUNTY NAME	Lawrence	Lawrence	Lawrence	Lawrence	Lawrence	Lawrence
Laboratory No. ....	G-3915	G-3957	G-3958	G-3959	G-3960	G-3961
Specific gravity .....	.832	.838	.8248	.8268	.8318	.8278
Equivalent Baume .....	38.3°	38.25°	39.7°	39.3°	38.3°	39.1°
Distilled below 150° C. (302° F.) *	20.8	22.0	23.0	21.7	20.8	23.0
Distilled 150°-300° C. (302°-572° F.) **	33.0	32.0	30.6	32.0	34.8	31.0
Residue***	44.0	46.0	44.5	44.5	44.5	45.0
Loss .....	2.2		1.9	1.8		1.0
Total .....	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....	.25					
Began to distill at:						
Centigrade .....	56°	50°	45°	40°	50°	51°
Fahrenheit .....	130°	122°	113°	148°	122°	124°

\* Gasoline fraction, per cent by volume.

\*\* Burning oil fraction, per cent by volume.

\*\*\* Per cent by volume.

COUNTY NAME	Lawrence	Lawrence	Lawrence	Lawrence	Johnson	Lawrence	Johnson	Carter
Laboratory No. ....	G-3962	G-3963	G-3964	G-3965	G-3971	G-3973		
Specific gravity .....	.8288	.8345	.8325	.8232	.8355	.863		
Equivalent Baume .....	38.9°	37.8°	38.2°	40.1°	37.5°	32.2°		
Distilled below 150° C. (302° F.) * .....	21.2	21.5	20.2	23.2	21.2	4.0		
Distilled 150°-300° C. (302°-572° F.) ** .....	33.3	31.5	33.5	31.2	29.0	38.6		
Residue*** .....	45.5	47.0	45.0	44.0	49.0	57.0		
Loss .....			1.3	1.6	.8	.4		
Total .....	100.0	100.0	100.0	100.0	100.0	100.0		
Sulfur, per cent by weight .....								
Began to distill at: .....	58°	58°	58°	43°	52°	80°		
Centigrade .....	136°	136°	136°	109°	126°	176°		
Fahrenheit .....								
COUNTY NAME	Elliott	Elliott	Johnson	Elliott	Hancock	Hancock		
Laboratory No. ....	G-4037	G-4038	G-4042	G-4059	G-4185	G-4166		
Specific gravity .....	.855	.8555	.8475	.8595	.8748	.8715		
Equivalent Baume .....	33.7°	33.6°	35.2°	32.9°	30.0°	30.6°		
Distilled below 150° C. (302° F.) * .....	15.0	15.4	15.0	11.0	8.1	9.1		
Distilled 150°-300° C. (302°-572° F.) ** .....	34.0	31.2	31.9	32.5	33.1	36.3		
Residue*** .....	51.0	53.4	52.5	56.0	58.8	54.6		
Loss .....			.6	.5				
Total .....	100.0	100.0	100.0	100.0	100.0	100.0		
Sulfur, per cent by weight .....	.20	.17	.27	.27				
Began to distill at: .....	46°	45°	53°	75°	100°	100°		
Centigrade .....	115°	113°	127°	167°	212°	212°		
Fahrenheit .....								

\*\* Burning oil fraction, per cent by volume.

\*\*\* Per cent by volume.

\*\* Burning oil fraction, per cent by volume.

COUNTY NAME	Barren	Barren	Clinton	Wayne	Cumberland	Cumberland
Laboratory No. ....	G-3878	G-3896	G-3939	G-3940	G-3942	G-3943
Specific gravity .....	0.839	0.862	0.822	0.833	0.8545	0.8355
Equivalent Baume .....	36.9°	32.4°	43.3°	38.0°	33.8°	37.6°
Distilled below 150° C. (302° F.)*	18.1	2.5	27.5	25.8	8.5	17.6
Distilled 150°-300° C. (302°-572° F.)**	46.3	54.4	33.5	35.0	43.5	39.5
Residue***	35.0	43.1	37.0	38.5	47.5	42.5
Loss .....	.6		2.0	.7	.5	.4
Total .....	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....		1.01		0.42	0.30	
Began to distill at:						
Centigrade .....		80°	45°	50°	67°	65°
Fahrenheit .....		176°	113°	122°	152.6°	149°
COUNTY NAME	Cumberland	Cumberland	Wayne	Wayne	Wayne	Clinton
Laboratory No. ....	G-3944	G-3947	G-3948	G-3949	G-3950	G-4072
Specific gravity .....	0.868	0.830	0.8255	0.8362	0.811	0.8235
Equivalent Baume .....	31.3°	38.7°	39.6°	37.4°	42.6°	44.4°
Distilled below 150° C. (302° F.)*	2.5	23.5	28.5	25.0	28.8	26.0
Distilled 150°-300° C. (302°-572° F.)**	50.0	41.5	36.5	32.5	32.5	34.0
Residue***	47.5	35.0	35.0	42.0	36.5	38.0
Loss .....				.5	2.2	2.0
Total .....	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....	.38					
Began to distill at:						
Centigrade .....	90°	60°	54°	57°	38°	35°
Fahrenheit .....	194°	140°	129°	135°		95°

\* Gasoline fraction, per cent by volume.

\*\* Burning oil fraction, per cent by volume.

\*\*\* Per cent by volume.

COUNTY NAME	Warren	Allen	Allen	Allen	Allen	Simpson	Simpson
Laboratory No. ....	G-3977	G-3981	G-3981	G-3982	G-3983	G-3984	G-3985
Specific gravity .....	.830	.813	.815	.815	.853	.822	.845
Equivalent Baume .....	38.7°	42.4°	42.4°	41.8°	34.1°	40.3°	35.7°
Distilled below 150° C. (302° F.)* .....	25.2	27.6	26.5	26.5	17.0	28.5	13.0
Distilled 150°-300° C. (302°-572° F.)** .....	36.6	36.5	34.5	34.5	34.5	35.0	47.0
Residue*** .....	37.5	35.9	38.0	38.0	48.0	36.0	39.5
Loss .....	.7		1.0	1.0	.5	.5	.5
Total .....	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....	0.7	0.6	0.7	0.7	0.4	0.6	0.6
Began to distill at: .....							
Centigrade .....	41°	35°	45°	45°	75°	46°	104°
Fahrenheit .....	106°	95°	113°	113°	167°	115°	219°
COUNTY NAME	Simpson	Simpson	Simpson	Simpson	Warren	Warren	Warren
Laboratory No. ....	G-3986	G-3987	G-3987	G-3988	G-3989	G-3990	G-3991
Specific gravity .....	.820	.825	.825	.851	.875	.874	.835
Equivalent Baume .....	40.8°	39.7°	39.7°	34.5°	30.1°	30.3°	37.7°
Distilled below 150° C. (302° F.)* .....	26.5	26.0	26.0	26.0	43.0	42.0	20.5
Distilled 150°-300° C. (302°-572° F.)** .....	35.5	38.0	38.0	42.5	57.0	58.0	33.5
Residue*** .....	37.0	36.0	36.0	47.5			45.0
Loss .....	1.0						1.0
Total .....	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....	0.4	0.5	0.5	0.5	0.8	0.6	0.3
Began to distill at: .....					Above		
Centigrade .....	47°	58°	58°	90°	150°	164°	42°
Fahrenheit .....	117°	136°	136°	194°	302°	327°	108°

\* Gasoline fraction, per cent by volume.

\*\* Burning oil-fraction, per cent by volume.

\*\*\* Per cent by volume.

COUNTY NAME	Warren	Warren	Warren	Warren	Warren	Warren
Laboratory No. ....	G-3992	G-3993	G-3994	G-3995	G-3996	G-3997
Specific gravity .....	.831	.834	.851	.872	.834	.838
Equivalent Baume .....	38.5°	38.0°	34.5°	30.5°	37.9°	37.1°
Distilled below 150° C. (302° F.) * .....	20.0	23.0	16.0	5.0	21.5	21.0
Distilled 150°-300° C. (302°-572° F.) ** .....	32.5	36.0	37.0	36.0	31.5	35.5
Residue*** .....	46.0	40.5	47.0	59.0	46.5	43.5
Loss .....					0.5	
Total .....	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....	0.4	0.5	0.4	0.7	0.4	0.4
Began to distill at: .....						
Centigrade .....	47°	48°	64°	103°	46°	43°
Fahrenheit .....	117°	118°	147°	217°	115°	109°
COUNTY NAME	Simpson	Warren	Warren	Warren	Carter†	Lee
Laboratory No. ....	G-3998	G-3999	G-4000	G-4001	G-4026	G-4027
Specific gravity .....	.860	.851	.828	.839	.949	.816
Equivalent Baume .....	32.9°	34.5°	39.1°	37.0°	17.5°	41.7°
Distilled below 150° C. (302° F.) * .....	9.5	11.0	21.0	21.5		23.0
Distilled 150°-300° C. (302°-572° F.) ** .....	41.5	42.0	33.5	35.0	15.0	31.0
Residue*** .....	49.0	47.0	45.0	43.0	85.0	45.5
Loss .....			.5	.5		.5
Total .....	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight .....	0.4	0.7	0.7	0.8	0.2	
Began to distill at: .....						
Centigrade .....	90°	80°	43°	48°	235°	39°
Fahrenheit .....	194°	176°	109°	118°	455°	102°

\* Gasoline fraction, per cent by volume.

\*\* Burning oil fraction, per cent by volume.

\*\*\* Per cent by volume.

† This specimen came from an oil seep and was asphaltic.

COUNTY NAME	Lee	Lee	Lee	Lee	Lee	Lee	Lee
Laboratory No. ....	G-4028	G-4029	G-4030	G-4031	G-4032	G-4033	
Specific gravity .....	.812	.820	.815	.817	.815	.826	
Equivalent Baume .....	42.4°	40.7°	41.8°	41.4°	41.8°	39.5°	
Distilled below 150° C. (302° F.) * .....	23.0	24.0	24.0	22.5	23.5	22.5	
Distilled 150°-300° C. (302°-572° F.) ** .....	30.5	30.5	30.0	30.5	30.0	30.5	
Residue*** .....	46.0	45.0	45.0	46.0	45.5	46.0	
Loss .....	.5	.5	1.0	1.0	1.0	1.0	
Total .....	100.0	100.0	100.0	100.0	100.0	100.0	
Sulfur, per cent by weight .....							
Began to distill at: .....							
Centigrade .....	38°	39°	40°	36°	40°	45°	
Fahrenheit .....	100°	102°	104°	96.8°	104°	113°	
COUNTY NAME	Lee	Lee	Monroe	Clay Co., Tenn.	Clay Co., Tenn.	Owen	
Laboratory No. ....	G-4034	G-4035	G-4108	G-4109	G-4110	G-4210	
Specific gravity .....	.816	.815	.826	.827	.835	.846	
Equivalent Baume .....	41.6°	41.8°	39.5°	39.4°	37.8°	35.5°	
Distilled below 150° C. (302° F.) * .....	23.0	22.5	23.0	20.5	15.5	19.0	
Distilled 150°-300° C. (302°-572° F.) ** .....	30.5	30.5	49.0	38.5	45.5	32.5	
Residue*** .....	45.5	46.0	38.0	40.0	48.0	48.0	
Loss .....	1.0	1.0		1.0		0.5	
Total .....	100.0	100.0	100.0	100.0	100.0	100.0	
Sulfur, per cent by weight .....							
Began to distill at: .....							
Centigrade .....	32°	31°	59°	46°	95°	53°	
Fahrenheit .....	89.6°	87.8°	138°	115°	203°	127°	

\* Gasoline fraction, per cent by volume.

\*\* Burning oil fraction, per cent by volume.

\*\*\* Per cent by volume.





V.  
EXPLORATIONS FOR OIL AND GAS  
IN  
BOYD COUNTY, KENTUCKY.\*

Although it is the smallest in area of any major subdivision of Eastern Kentucky, Boyd County (165.32 square miles), situated at the confluence of the Big Sandy and Ohio Rivers,



Dissected Plateau Near Princess, Boyd County.

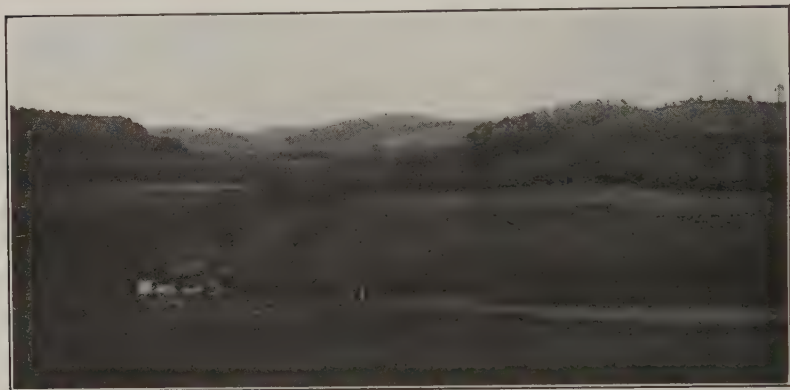
possesses a very unique and strategic geographical location. This position important in any consideration of transportation and industry is in itself adequate compensation for a reduced boundary. The county was established in 1860 from parts of Greenup, Carter and Lawrence counties. These counties bound Boyd in their respective order on the North, West and South. The States of West Virginia and Ohio join it on the East.

The principal city of Boyd County is Ashland (founded in 1854) a very rapidly growing iron, steel, fire brick, and general manufacturing center. Its population now increasing steadily was 14,729 in 1920 and is now estimated to be 23,250 or more. Catlettsburg, a much smaller though older town, is the county seat. The field work supplying the data upon

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\*Presented before the 12th annual meeting of the Ky. Acad. of Science at Lexington, Ky., May 15, 1925.

which this paper is founded has been executed by the writer in person at various intervals during the last several years.



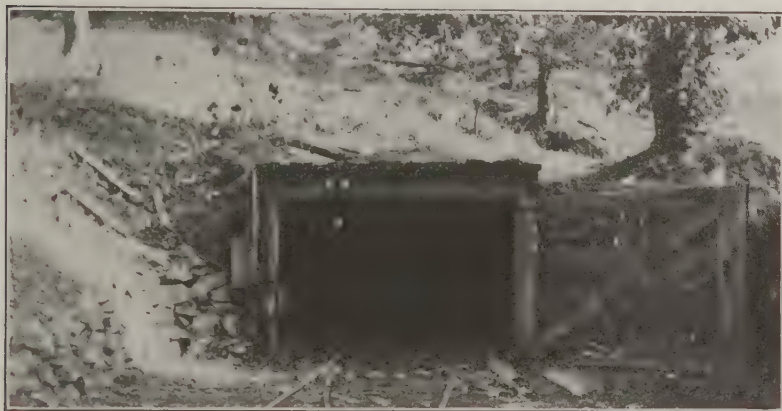
Straight Creek Valley Near Coalton.

#### TOPOGRAPHY AND DRAINAGE

Topographically, Boyd County is not as rough an area as its internal position in the Eastern Kentucky coal field might seemingly indicate. It is in reality a low, hilly country, mature in its dissection. Old plateau summit levels rise from 800 feet in the Northern part of the county to about 1,000 feet at the Lawrence County line in the south. Trenching in to this old abandoned channel, notably in the vicinity of Ashland at surface, preglacial and glacial streams of large size have left abandoned channels, notably in the vicinity of Ashland at elevations of about 690 feet. The present flood plain level of the Ohio River is about 550 feet above sea level. From this elevation the tributary drainage grades upwards.

The highest point in the county is located on the divide three miles west of Savage, and is slightly in excess of 1150 feet. Boyd County, therefore, exhibits a maximum physical relief of 600 feet. The major drainage consists of the Ohio and Big Sandy Rivers which bound it on the Northeast and East. The minor drainage consists of the lower waters of the East Fork of Little Sandy River, and a number of small streams such as Durbin Creek, Whites Creek, Chadwick Creek, tributaries of the Big Sandy River; and Catletts Creek, Keys

Creek and Hoods Creek, tributaries of the Ohio River. The East Fork of Little Sandy flowing to the North into Greenup County and thence to the Ohio is the principal interior stream of the County.



A RUSH CREEK COAL MINE

The Coalton or No. 7 coal which has been operated here has extensive development in western Boyd County.

### STRATIGRAPHY

Rocks of Coal Measure age only are exposed in Boyd County. These Pennsylvania sediments consisting of an alternating series of sandstones, sandstone conglomerates, sandy shales, shales, fire clays, coals, and four or five thin and semi-persistent limestones, attain an aggregate thickness of about 1,000 feet. Of this stratigraphic section between 500 and 600 feet are exposed. These Coal Measure sediments have been divided<sup>1</sup> in ascending order into the Pottsville, Allegheny, and Conemaugh formations.

The greater part of the Pottsville occurs below drainage. It comes to the surface only in the valley bottoms of the northern part of the county. The Allegheny formation resting upon the Pottsville extends in outcrop as far south as Garner, Wavity, and Savage Station, while the Conemaugh blankets completely the southern third of the County. Ten separate coals have been recognized in this group of Pennsyl-

<sup>1</sup> The Kenova Folio, W. C. Phalen, U. S. Geol. Survey, Folio No. 184, Washintgon, 1913.

vanian rocks, and of these five the lower Freeport (No. 8), Middle Kittaning (No. 7), Lower Kittaning (No. 6), Upper Mercer (No. 4) and Lower Mercer (No. 3) attain some commercial importance.



Plastic Fire Clay Near Rush Station.

Beneath the surface rocks are found sedimentary representatives of the Mississippian, Devonian, Silurian and Ordovician systems within the first 3,000 feet of depth.

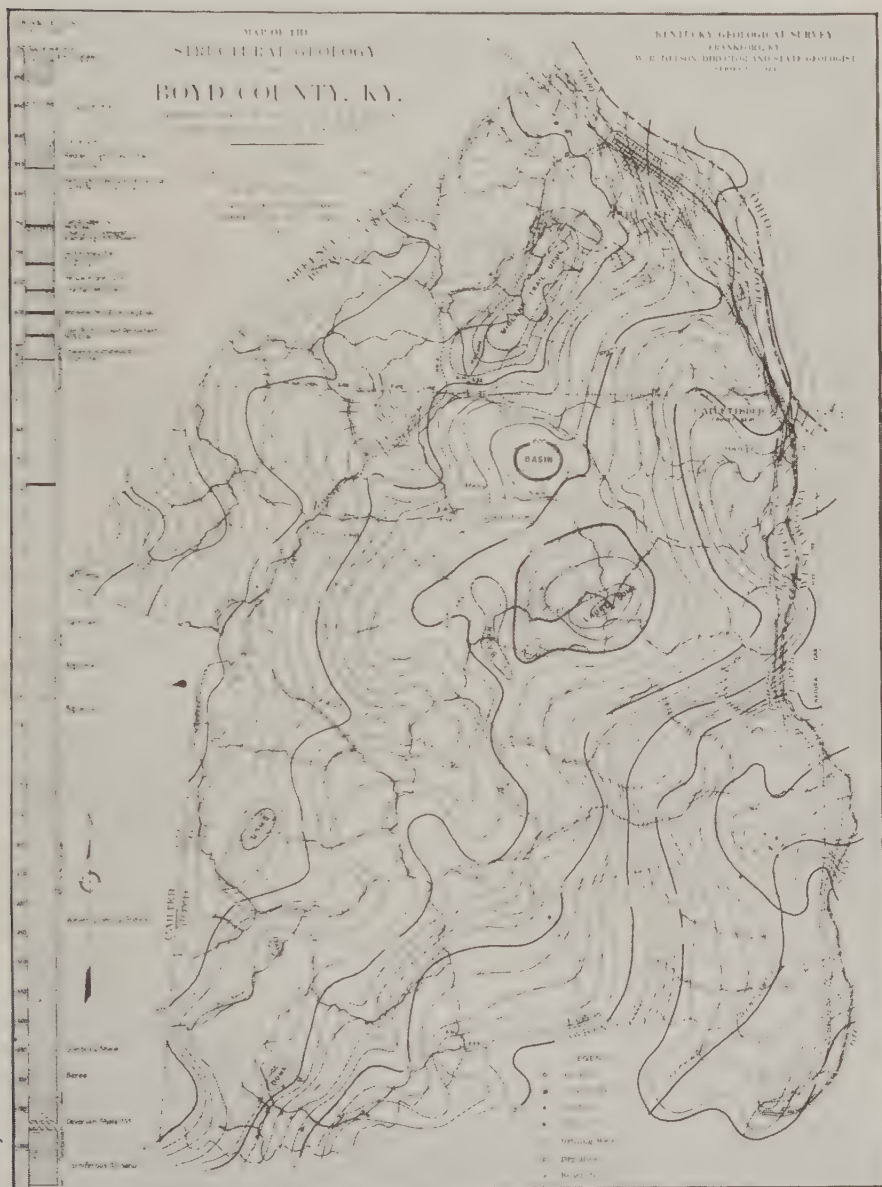
#### STRUCTURE

The structure of the bedded rocks of Boyd County is simple. The region is not faulted, and all sediments are tilted at very slight angles with the horizontal. No pronounced folds are known within this area. The normal surface dip (Fire Clay coal) is to the southeast at the rate of 35 feet to the mile. The subsurface dip on the top of the Sunbury shale is to the southeastward at the rate of 67 feet to the mile.

The surface structure has been completely mapped<sup>2</sup> on fire clay coal. It exhibits three small domes: (1) The Midland Trail Dome (elongated) immediately southwest of Ashland, (2) the Laurel Dome (circular) about four miles southwest of Catlettsburg, and (3) a small closed structure at the head of Four

<sup>2</sup> Map of the Structural Geol. of Boyd County, Ky., by J. S. Hudnall. Ky. Geol. Survey, Series VI, 1924.





Surface Structural Geology of Boyd County, Ky.



Mile Creek in the southwestern part of the county near the Carter line. The East Fork anticline and Ashland anticline are the most pronounced structures of this type in this county. The lockwood syncline, the southwestern extremity of a Geo-syncline extending into West Virginia, enters the county at Lockwood Station on the Big Sandy River. It exhibits the lowest surface structural position in this county.

Subsurface structure in Boyd County is significantly unconformable to that shown at the surface. On the top of the Big Lime (Mississippian) the two largest closed structures, the Midland Trail Dome and the Laurel Dome, are barely perceptible. On the top of the Sunbury shale (Mississippian) those structures are replaced by plunging anticlines, and on the top of the Corniferous Limestone (Devonian) there is no evidence available at the present time to indicate any important structure at all.

The normal dip to the southeast on the top of the Big Lime (Mississippian) is about 60 feet to the mile, while on the top of the black Sunbury shale (Mississippian) it averages nearly 67 feet to the mile. On the top of the Corniferous (Devonian) limestone the average dip to the southeast is 86.5 feet per mile. From the vicinity of Summit Station in the North-central part of the county to Kavanaugh Station on the Big Sandy River, the thickening of the Coal Measures (lower Pennsylvanian) below the Fire Clay Coal down to the top of the Sunbury shale (lower Mississippian) is about 562 feet.

#### OIL AND GAS SANDS

A number of oil and gas sands are recognized in Boyd County. In descending order the uppermost of these is the "First Salt Sand," the "Grass Root Sand" of drillers. It is of Pottsville age and generally shows some gas and considerable salt water. The "Second Salt Sand" beneath it is also of Pottsville age, frequently conglomeritic and produces both gas and salt water. Underlying this sand sometimes closely and frequently separated by a sandy shale, irregular and lenticular, and frequently cut out entirely, is the "Third Salt Sand." It has not yet been shown to be of commercial importance.

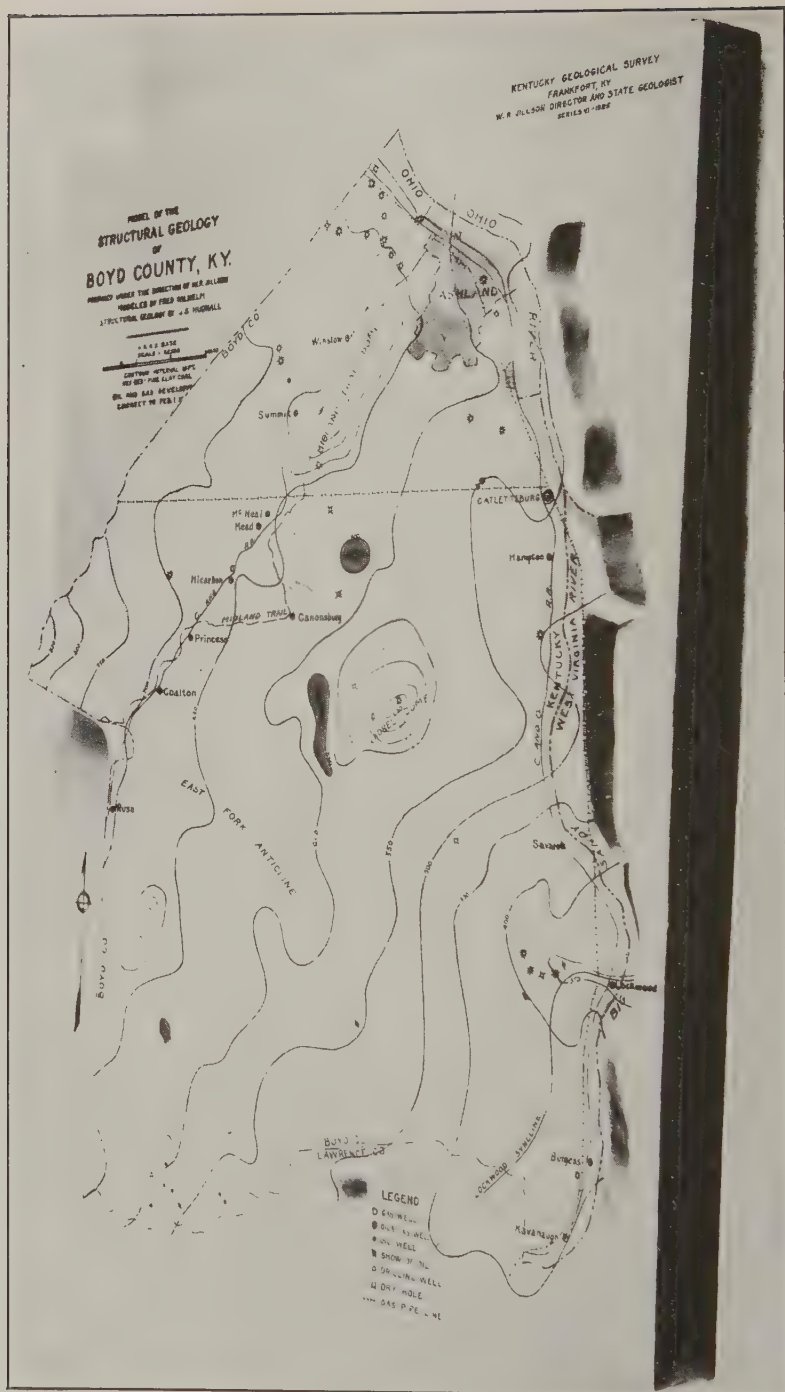
Occurring almost immediately below the Big Lime (Chester-Mississippian) the "Big Injun" gas sand, showing natural gas and large amounts of salt water, is sharply defined and easily



SUB-SURFACE STRUCTURE NEAR ASHLAND

The contours are on the top of the Sunbury Shale (Mississippian) and are given in feet below sea level. Structure by W. R. Jillson, 1925.

recognized wherever drilled. For about 600 feet below the "Big Injun" the Mississippian rocks consisting of sandy shales (Logan and Cuyahoga formations) are unproductive. The Cuyahoga contains elsewhere and principally to the southeast



in the Johnson-Magoffin-Lawrence-Elliott field along the Paint Creek Uplift the well known and productive Wier sand. It has not any commercial importance in Boyd County up to the present time, and so is not recognized by drillers. The "Berea sand" occurring about 700 feet below the top of the Mississippian is generally productive of oil in small amounts and sometimes of natural gas in commercial quantities. Separated from the Berea by a thin shale the underlying Bedford sandstone is generally a gas producer. It is commonly but erroneously regarded by drillers as the lower part of the Berea, and is thus frequently discussed and recorded in well logs.

The underlying Devonian shales (Ohio and Chattanooga) exhibit at various points three separate and distinct gas producing horizons. These are not true sands, but are very slightly sandy of lightly calcareous phases of the black shale, characterized by a relatively high porosity. These "sands" have been denoted I. the "Shale Sand," II. the "Gordon Sand" and III. the "Ashland Gas Sand." Accurate correlations at this time are quite impossible, due to a lack of detailed well records. Further drilling may clarify these relationships and indicate a possible basis of correlation with other portions of the Appalachian field. The so-called Corniferous limestone (Hamilton and Onondaga-Middle Devonian) immediately subjacent is a well known producer of oil and gas in Kentucky. In Boyd County it has produced oil in small quantities, but good quality at a number of points, notably in the vicinity of Summit and Ashland. Its gas production is generally small in quantity as compared to the Appalachian gas sands, but when properly cared for is of relatively long life.

Beneath this horizon, which is found at depths ranging from 2,000 to 2,800 feet, no other commercially important oil and gas producing horizons are now known in Boyd County. The Clinton Sand, so productive in parts of Eastern Ohio and elsewhere, has been found to be unproductive at all points where penetrated in Boyd County and adjacent parts of Carter County and Ohio\*. It should be pointed out, however, that only a rela-

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\*The Clinton "sand" was drilled dry at 4,500 to 4,540 feet in a well drilled 15 miles east of Huntington, W. Va., and 2.7 miles northwest of Milton, by the Nixon Oil and Gas Co., in 1924. This well was abandoned at 4,850 feet.

tively few wells have penetrated this deep Silurian Sand. A summary of productive sands of this region indicates that the "Salt Sand," "Big Injun" sand, the "Berea" sand, and some one or two of the three "sands" in the Devonian shale are the



Massive Mahoning Sandstone, Shope Creek.

most important natural gas horizons. The "Berea" sandstone and the "Corniferous" limestone are the only ones which may be looked to for petroleum in commercial quantities. Wherever drilled in each of these "sands" produces some oil and in the vicinity of Summit, Ashland and on Laurel Creek a number of wells have produced as much as five or more barrels from these sands. While the outlier of relatively high regional metamorphism (60%) surrounding Ashland operates theoretically to reduce the available volume of petroleum and increase the volume of natural gas, the fact remains that oil of fairly high gravity and splendid lubricating base has been discovered at a number of points. Higher prices for crude oil than those recently prevailing will undoubtedly bring about renewed interest in exploratory drilling and very possibly may result in the discovery of one or more important fields.

#### DEVELOPMENT AND PRODUCTION

Although definite records are not available, it appears that the first wells drilled for oil and gas in Boyd County were spudded in and completed during the decade, 1880-1890. Several wells are reported to have been drilled during the



period, 1890-95, when there seems to have been considerable interest in oil and gas exploration, principally by the old and now defunct Ashland Iron and Mining Company, of Ashland, Kentucky. A number of these old and abandoned wells,



A DANIELS FORK DRILLING

This is the Lewis Skaggs No. 1 drilling in the Devonian shale, April 2, 1925. Wm. Foreman, contractor.

notably the Longabaugh well at Winslow Station, the well southeast of Summit Station on the American Rolling Mill Co.'s property, and the Towler well one mile northwest of Princess were shallow, penetrating according to records and report only as far as the "Big Injun" or "Berea" Sands. Records of the Old Summit and Winslow wells have fortunately been preserved, but the Towler log if ever recorded has long since been lost.

About 1895 to 1900 deeper drilling began to be undertaken, and it was at this time that natural gas in the Devonian black shale was first found. An example of the successful deep wells of this time is seen in the W. A. Patton No. 1 gasser on Catletts Creek which was originally a very good producer, and had, it is estimated, about 500,000 cubic feet daily open flow. It has recently been producing according to reports a measured 70,000 cubic feet of gas daily. Sporadic drilling continued with alternating success and failure until 1917-18 when the Ashland Iron and Mining Company, under the superintendency of Mr. J.



C. McCarthy, again undertook a drilling campaign in search of natural gas for industrial purposes. About 10 deep wells were drilled during this period slightly northwest of Ashland and a considerable amount of natural gas varying in estimated open



JESSIE HORN GASSER, NEAR ASHLAND

This is one of a group of gas wells drilled several years ago west and northwest of Ashland by J. C. McCarthy for the A. C. and I. Co. It is still producing.

flow volume from 250,000 to 750,000 cubic feet, with a rock pressure ranging from 700 to 800 lbs. was secured principally in the immediate vicinity of Ashland. This production came for the most part from three gas "sands" in the Devonian shale. This was carefully conserved and piped into Ashland for industrial purposes, where it is still being used though in somewhat diminished volume.

During the period of 1919-1923 a considerable amount of oil and gas prospecting was undertaken by various individuals and local corporations organized for this purpose. The Good Losers Oil and Gas Company extended its development at this time in the Southwestern part of the county on Bolts Fork in the vicinity of Mayhew P. O. With one exception, the H. J. Ross No. 1 well 2,667 feet, these wells were drilled to medium depths of 1,700 to 1,900 feet. This development resulted in the production of about 8 small oil wells in the "Berea" sand. In the eastern part of the county the best producers of this period were the Williams gassers near Lockwood Station on the Big

Sandy River. Production was secured according to reports from a shallow sand, possibly the "Salt Sand," and was accompanied by large volumes of water.

During the last two years, 1924-1925, a very considerable amount of carefully projected oil and gas development has been carried forward in Boyd County by the Summit Oil and Gas Co. and the American Rolling Mill Co., both of Ashland, Kentucky. This exploration has been confined to the Northern part of the county from Laurel Creek northward to the Greenup County line. The main objective of this most recent campaign was commercial amounts of natural gas for industrial purposes. Practically all of these wells, numbering twenty-two, have been drilled through to the bottom of the Devonian shale or into the Corniferous limestone. Fourteen commercial gassers ranging up to about 1,500,000 cubic feet daily volume open flow capacity with rock pressures varying from 650 to 800 lbs., and two oil wells each conservatively estimated at about 5 bbls. are the net results to date. Further drilling is now in progress with the Devonian shale "sands" the principal productive objective.

### SUMMARY

A summary of geological conditions and the results of oil and gas drilling up to the present time presents an interesting future for this area. The stratigraphic section exhibits at depths varying from 450 to 2,800 feet, nine possible gas "sands" of which five or six are frequently encountered in an individual well. Two productive oil sands are known. A total of about 73 wells have been drilled in Boyd County, and several wells are now drilling or are in immediate prospect. Of the 73 completed wells 34 were or are commercial gassers, eleven wells were or are small or commercial oil producers, thirteen wells show oil and gas but were not commercial, and fifteen wells were dry holes.

At the present time 60% of the wells drilled have been of commercial importance with certain indications that the region as a whole is a natural gas rather than an oil territory. This conclusion based upon a complete inventory of the production of the entire field is further checked by the occurrence of high carbon ratios in the surface coals. The 60% isocarb enters Boyd County at Savage Station, and looping westward through Gar-

ner crosses portions of eastern Carter and southeastern Greenup counties, where it turns back eastward through Bellefont into Ohio. An outlier of relatively high regional metamorphism, the anomalous cause of which is at present beyond inference, is



GEORGE FOLEY NO. 1 GASSER

This producing well is located on Hoods Creek one mile north of Summit Station, Boyd County, Ky.

thus indicated for the Northern part of Boyd County. In conclusion it may be said that the Berea sand (Mississippian) and the Ashland gas "sands" (Devonian) are the horizons of greatest expectation and possibility. The rapid industrial and commercial development of the region about Ashland, Catlettsburg, and Russell (Greenup County) indicates that the demand for natural gas for both domestic and industrial use will always be in excess of the locally produced supply. This in turn may be interpreted as an adequate cause for continued prospecting for oil and gas in this region during the next several decades. Detailed studies of the structural position, thickness and porosity of the principal producing oil and gas sands indicate that future prospecting when attended by precise geological work will result in a relatively high number of successful completions as compared to the poor results of much drilling that was completed in this region prior to 1923.

#### ANALYSES

Little has been done in the way of testing the petroleum produced in Boyd County. The gravity, however, is of Somerset

grade at all points where analyses have been made of freshly produced samples. Herewith are given analyses of two specimens collected near Summit in Northeastern Boyd County. The grade of the oil in this vicinity is uniformly good. The analyses follow:



A LAUREL CREEK DRILLING

This well located on the Laurel Dome produced considerable gas and some oil from the black shale and Berea sands.

Two samples of petroleum received November 2, 1925, from Dr. W. R. Jillson, State Geologist, Frankfort.

Laboratory No. G-4227—Labeled "Crude petroleum (from well), 1¼ miles southeast of Summit, Boyd County, Ky., American Rolling Mill Co., No. 13, Corniferous sand, depth 2237 ft. Collected by W. R. Jillson, Oct. 28, 1925."

Laboratory No G-4228—Labeled same as preceding, except the note that this sample was "from tank," and "this petroleum had been in tank one week."

No. G-4227—Specific gravity .8596=32.9° B.

Per Cent by Volume .

Distillate below 150° C. (302° F.).....	3	Gasoline fraction
Distillate 150°-300° C. (302°-572° F.).....	30	Burning oil fraction
Thick green residue .....	67	
<hr/>		
Total .....	100	

Sulphur .2% by weight.

Began to distill at 124° C.

No. G-4228—Specific gravity .8625=32.3° B.

Per Cent by Volume

Distillate below 150° C. (302° F.).....	1.0 Gasoline fraction
Distillate 150°-300° C. (302°-572° F.).....	30.7 Burning oil fraction
Residue .....	68.3

Total ..... 100.0

Sulphur .2% by weight.

Began to distill at 140° C.

Nov. 4, 1925.

(Tests by A. M. Peter.)

A. M. PETER, Chief Chemist.

## SUMMARY OF OIL AND GAS WELLS OF BOYD COUNTY, KENTUCKY, AND VICINITY

Log No.*	Lessor	Lessee	Location	C. H. E.†	Top Sunbury† Shale	Pro- duc- tion
1.	W. A. Patton No. 1.	Big Sandy Oil & Gas Co.	Catletts Ck.....	557.0	823	Gas
2.	Richardson No. 1.	2 mi. S. Catlettsburg..		552.0	880	Gas
3.	Bellefonte Brick Co.,	2 mi. N. W. Ashland		632.0		Dry
4.	Bellefonte Brick,	W. of C. & O. R. R.....		545.3	630	Gas
5.	R. Prichard No. 1,	1 mi. N. Kavanaugh Sta. ....		570.0	1295	Gas
6.	(A. I. & M. Co.)	Armco, Shope Ck.....		615.8	601	Dry
7.	(A. I. & M. Co.)	Armco, ¾ mi. E. Summit		778.5	547	Dry
8.	W. I. Ross No. 1,	Bolts Fork.....		734.8	995	Oil
9.	John Murphy No. 1,	Ashland, Ky.....		626.3	631	Gas
10.	Belle Ross No. 1,	Bolts Fork .....		685.6	952?	Oil
11.	Clara Williams No. 1,	1¼ mi. W. Lockwood Sta. ....		663.1	1130	Dry
12.	Lockwood No. 1,	Huntington G. & D. Co., Lockwood Sta. ....		551.0		Dry
13.	Jesse Horn No. 1,	Little Hoods Ck.....		532.9	644	Gas
14.	(A. I. & M. Co.)	Armco, Little Hoods Ck.		537.4	601?	Dry
15.	Westwood Dev. Co.,	No. 1, Armco, Hoods Ck. ....		545.4	611?	Gas
16.	Bellefonte Brick Co.,	Hoods Ck. ....		577.0	608	Dry
17.	H. & O. Willis No. 1,	Armco, Little Hoods Ck. ....		563.6	619	Gas
18.	Wheatley & Seaton No. 1,	Armco, Little				

\*These well log numbers correspond to the numbers of the various well locations as shown on "Oil and Gas Map of Boyd Co., Ky.," by W. H. Jillson, Ky. Geol. Survey, Series VI, colored. Scale 1:625000, correct to April 1, 1925.

†All casing head elevations by spirit level, checked.

‡Depth below sea level.



Log No.*	Lessor	Lessee	Location	C. H. E.†	Top Sunbury† Shale	Pro- duc- tion
	Hoods Ck. ....			650.0	605	Gas
19.	C. J. Bocklage No. 1, Armco, ½ mi. W.					
	Ashland .....			575.0	640	Gas
20.	B. Shields No. 1, Armco, 1 mi. W. Ash-					
	land .....			606.9	606	Gas
21.	Ashland Fire Brick Co., No. 1, Ashland..			557.3	638?	Gas
22.	Ashland Steel Co., No. 1, Ashland.....			546.4	674	Dry
23.	J. C. Riffe No. 1, Bolts Fork.....			703.3	963	Oil
24.	Crit Ross No. 1, Southern Boyd Co.....			684.9	1074	Oil
25.	Longabaugh No. 1, 600 ft. S. E. Winslow					
	Sta. ....			586.0		Dry
26.	J. F. Hutchison No. 1, near Summit Sta...			624.9	493	Gas
27.	J. S. Patton No. 1, Keys Creek .....			548.7		Gas
28.	J. L. Stanley, Indian Run (Greenup Co.)..			676.6	469	Dry
29.	W. H. Spears No. 1, Armco No. 1, Laurel					
	Ck. ....			680.3	753	Gas
30.	Albert Bartram No. 1, Armco No. 2,					
	Chaderick Ck. ....			726.5	770	Dry
31.	J. M. Ross No. 1, Armco No. 3, Marsh					
	Run .....			631.5	674	Dry
32.	Pat O'Brien No. 1, Armco No. 4, Laurel					
	Ck. ....			678.2	724	Dry
33.	J. F. Mason No. 1, Armco No. 5, Shope					
	Ck. ....			675.4	575	Gas
34.	B. F. Lucas No. 1, Summit O. & G., Hoods					
	Ck. ....			602.1	492	Gas
35.	G. Fraley No. 1, Summit O. & G., Hoods					
	Ck. ....			606.7	494	Gas
36.	Ike Fannin No. 1, Kent Millis, et al., Bear					
	Ck. ....			620.7	1129	Dry
37.	J. H. Elam No. 1, Pet. Ex. Co., Cane Ck.					
	(Greenup Co.) .....			611.8	no log	Oil
38.	A. Elam No. 1, Pet. Ex. Co., Cane Ck.					
	(Greenup Co.) .....			628.8	304	Oil
39.	K. Towler No. 1 (no log), Little East Fk.			589.6	446?	Gas
40.	Jack Arthur No. 1, Whites Creek .....			634.4	G. 1030	Dry
41.	John Haney No. 1, 1 mi. W. of C. & O.					
	Ry., Horse Br. ....			598.8	G. no log	Dry
42.	Lacy Howard No. 1, Armco No. 17, So.					
	Summit Sta. ....			695.3	538?	Dry
43.	Cary Fannin No. 1, S. of Bolts Fk.					
	Lawrence Co. ....			662.7	no log	Oil
44.	H. J. Ross No. 1, ¾ mi. N. Mayhew .....			868.4	no log	Oil
45.	A. A. Findley No. 1, Bolts Fk.....			663.0	no log	Oil



Log No.*	Lessor	Lessee	Location	C. H. E.‡	Top Sunbury† Shale	Pro- duction
46.	A. A. Findley No. 2,	Bolts Fk.....	667.4	no log	Oil	
47.	W. A. Patton No. 2,	Catletts Ck.....	598.0	no log	Dry	
48.	Calvin Earle No. 1,	Whites Ck.....	634.7	no log	Gas	
49.	Clara Williams No. —,	Lockwood Ck.....	654.4	no log	Dry	
50.	Clara Williams No. —,	Lockwood Ck.....	681.2	no log	Gas	
51.	Clara Williams No. —,	Lockwood Ck.....	696.4	no log	Dry	
52.	Clara Williams No. —,	Lockwood Ck.....	727.0	no log	Gas	
53.	Clara Williams No. —,	Lockwood Ck.....	791.5	no log	Dry	
54.	Clara Williams No. —,	Lockwood Ck.....	703.2	no log	Dry	
55.	Stanley at Mayhew	.....	717.2	no log	Gas	
56.	Herman Lumber Co.,	Ashland, Ky.....	565.0	no log	Dry	
57.	Ashland Leather Co.,	Ashland, Ky.....	552.7	no log	Gas	
58.	Lewis Skaggs No. 1,	Daniels Fork.....	709.0	409	Dry	
59.	Mrs. McCoun No. 1,	near Ashland, Ky....	574.8	no log	Dry	
60.	Mrs. McCoun No. 2,	near Ashland, Ky....	570.3	no log	Dry	
61.	Mrs. Maud Cyrus No. 1,	Rt. Fk. Durbin Ck. ....	707.4	G. no log	Oil	
62.	Kincaid No. 1, White Oak Ck. (Greenup Co.) .....	540.1	no log	Dry		
63.	Armco No. 15 S. E. Summit Sta.....	695.2	585?	Gas		
64.	Nando Felty No. 1, Armco No. 16, So. Summit Sta. ....	691.2	560	Dry		
78.	Armco No. 18, 3 mi. W. of Ashland.....	693.2	shallow	Gas		
79.	Armco No. 19, 2½ mi. W. of Ashland.....	642.5	567	Gas		
80.	Armco No. 20, head of Keys Ck.....	701.17	601	Gas		
81.	Armco No. 21, head of Mason Br.....	742.78	577	Gas		
102.	S. J. Debord No. 1, Summit Sta., Boyd Co., Ky. ....	702 Bar	506	Gas		
111.	Armco No. 22, 2d bend, Midland Trail, W. Ashland .....	710.0	576	Gas		
112.	J. W. Johnson, No. 1, head Wilson Ck., Carter Co. ....	671.0	468	Dry		
113.	Armco No. 23, head of Keys Ck.....	658.6	618	Gas		
114.	Armco No. 24, head of Keys Ck.....	722.0	619	Gas		
115.	Armco No. 25, head of Keys Ck., ¾ mi. S. Winslow Sta. ....			Gas		

REVISED RECORDS FOR OIL AND GAS WELLS DRILLED IN  
BOYD COUNTY, KENTUCKY, AND VICINITY.

WELL No. 1 (O. & G. Res., p. 217).

W. A. Patton No. 1, lessor (formerly Brown). Big Sandy Oil and Gas Co., lessee. Location Catletts Creek 1½ miles from Catlettsburg, Ky. Originally a very good well (about 30 years ago). Production in

1924, 80,000 cu. ft. Call Ashland Water Works for drilling time. Gas now used by Catlettsburg Water Works. C. H. E. 557 ft. A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	36	36
PENNSYLVANIAN SYSTEM		
Sandstone .....	104	140
Shale, clay .....	100	240
Sandstone, gray .....	30	270
Shale .....	150	420
Sandstone, "Pottsville" .....	150	570
MISSISSIPPIAN SYSTEM		
Limestone, "Big Lime" .....	280	850
Sandstone, black .....	100	950
Sandstone, white—salt water.....	15	965
Sandstone, black .....	35	1000
Shale, black—oil show .....	329	1329
Sandstone, oil .....	51	1380
Shale, black—"Sunbury" .....	45	1425
Sandstone, brown—"Berea" .....	15	1440
Shale and sandstone .....	5	1445
DEVONIAN SYSTEM		
Shale, black .....	130	1575
Shale, white .....	40	1615
Shale, black .....	180	1795
Shale and shells .....	50	1845
Limestone, "Sand"—gas .....	5	1850
Shale, black .....	10	1860
Sandstone, black .....	15	1875
Sandstone and shale, black .....	3	1878
Shale, blue .....	12	1890
Shale, brown .....	7	1897
Shale, black .....	68	1965
Limestone, black—gas—"Gordon" .....	9	1974
Shale, black .....	52	2126
Total depth .....		2126

Note:—"Gordon Sand" was 520 feet in Devonian shale.

#### WELL No. 2. (O. & G. Res.; p. 218.)

Richardson Well. Location: Two miles south of Catlettsburg. Drilled about 1895. Production: Gas, in use in 1924. C. H. E. 552' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	10	10

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone .....	50	60
Coal .....	3	63
Sandstone and shale .....	167	230
Coal .....	5	235
Shale .....	270	505
Sandstone, salt water—gas .....	205	710
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, "Big Lime" .....	270	980
Sandstone .....	70	1050
Shale .....	15	1065
Shale and shells .....	373	1438
Shale, black—"Sunbury" .....	20	1458
Sandstone, oil—"Berea" .....	45	1503
Shale .....	15	1518
Sandstone, dark .....	10	1528
<b>DEVONIAN SYSTEM</b>		
Shale, black .....	40	1568
Sandstone, gray .....	15	1583
Shale and shells .....	447	2030
Limestone, black—gas—"Gordon" .....	40	2070
Shale, light .....	192	2262
Limestone, brown .....	60	2322
Total depth .....		2322

Note:—Gordon sand was 502 feet in Devonian Shale.

**WELL No. 3. (O. & G. Res., p. 219.)**

Bellefonte Brick Co., lessor, No. 1, gas well. Drilled by W. R. Van Sant, et al., lessees. Production: Dry. Drilled about 1910. C. H. E. 632.0' A. T.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	9	9
<b>PENNSYLVANIAN SYSTEM</b>		
Limestone .....	15	24
Shale, blue .....	126	150
Shale and shells .....	125	275
Shale, blue .....	50	325
Limestone .....	25	350
Shale .....	15	365
Sandstone—salt water .....	115	480
Shale—cased at 482 .....	30	510
Sandstone—salt water—"Pottsville" .....	20	530

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Big Lime" .....	40	570
Shale .....	30	600
Sandstone—"Big Injun" .....	20	620
Limestone and shale .....	15	635
Shale .....	70	705
Sandstone .....	10	715
Shale—cased at 730 .....	475	1190
Shale, brown—"Sunbury" .....	18	1208
Sandstone—"Berea"*—oil show .....	112	1320
Shale—sandy (red rock) .....	20	1340
Shale .....	20	1360
<b>DEVONIAN SYSTEM</b>		
Shale, brown .....	Ohio or "Chattanooga" {	130
Shale, white .....		35
Shale, brown .....		265
Shale, white .....		80
Shale, brown .....		110
Shale, Calcareous .....		35
Shale, brown .....		10
Limestone, dark .....		225
<b>SILURIAN SYSTEM</b>		
Limestone, light .....	125	2375
Shale and shells .....	40	2415
Limestone, hard white .....	35	2450
Total depth .....		2450

**WELL No. 4. (O. & G. Res., p. 220.)**

Bellefonte Brick Co., lessor. Means and Russell Iron Co., lessee. (Armco No. 1.) Location: Just west of C. & O. R. R. right of way, and near the mouth of Hoods Creek. Drilled 1912. Rock pressure, 700 lbs. when closed in. C. H. E. 545.36 feet A. T. Production: Natural gas.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	20	20
<b>PENNSYLVANIAN SYSTEM</b>		
Gravel and Quicksand .....	44	64
Limestone .....	11	75
Shale, blue—cased at 134—8¼" .....	85	160
Limestone, hard .....	50	210
Shale, blue .....	170	380
Sandstone, water .....	20	400

\*Only the upper part of this is Berea, the lower part being Bedford.

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, white—cased at 412—6¼" .....	40	440
Limestone, hard—"Big Lime" .....	60	500
Shale and lime shell .....	100	600
Sandstone—"Big Injun" .....	50	650
Shale, blue—cased at 725—5" .....	75	725
Shale, sandy .....	420	1145
Sandstone .....	30	1175
Shale—"Sunbury" .....	5	1180
Sandstone—"Berea" .....	60	1240
DEVONIAN SYSTEM		
Shale, brown—"Chattanooga" .....	470	1710
Shale and limestone (includes "Gordon")....	290	2000
Total depth .....		2000

## WELL No. 5. (O. &amp; G. Res., p. 220.)

Robert Prichard, lessor, No. 1. Location: About one mile north of Kavanaugh Station. Small gasser in 1924, abandoned. Ashland, Ky. C. H. E. 570' A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, blue .....	38	38
Gravel .....	5	43
Shale, blue .....	20	63
Shale .....	25	88
Sandstone .....	20	108
Shale .....	10	118
Sandstone .....	50	168
Shale and shells .....	174	342
Coal .....	3	345
Shale .....	27	372
Sandstone and limestone .....	68	440
Sandstone .....	45	485
Shale .....	35	520
Sandstone .....	55	575
Shale .....	5	580
Shale, brown—shells .....	165	745
Sandstone .....	20	765
Shale, black—shale and shells .....	79	844
Sandstone .....	104	948
Shale .....	30	978
Sandstone .....	90	1068

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, black .....	50	1118
Limestone, "Big Lime" .....	120	1238
Sandstone and shale .....	187	1425
Shale, dark .....	440	1865
Shale, black—"Sunbury" .....	20	1885
Sandstone—"Berea" .....	40	1925
Shale and shells .....	40	1965
DEVONIAN SYSTEM		
Shale, dark .....	"Ohio" {	2447
Shale, dark .....		2608
Shale, white .....		2736
Shale, brown .....		2785
Limestone—"Corniferous" .....		2880
Total depth .....		2880

## WELL No. 6. (O. &amp; G. Res., p. 221.)

Clinton tract of American Rolling Mill Co. (Ashland Iron and Mining Co., original lessor). Location: Shope Creek. Drilled prior to 1900. Dry hole. C. H. E. 615.8' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	15	15
PENNSYLVANIAN SYSTEM		
Sandstone, gray .....	10	25
Shale, blue .....	10	35
Coal .....	4	39
Shale .....	31	70
Coal .....	4	74
Shale .....	14	88
Sandstone .....	26	114
Shale, white .....	56	170
Shale, black—8" casing .....	65	235
Shale, white .....	50	285
Coal .....	3	288
Shale, blue .....	14	302
Shale, black .....	113	415
Sandstone, salt water .....	55	470
Shale .....	20	490
Sandstone, salt water—"Pottsville" .....	50	540
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	90	630
Shale .....	4	634
Sandstone—salt water at 705 .....	131	765



Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Shale—cased at 765 .....	40	805
Sandstone and shale .....	411	1216
Shale, black—"Sunbury" .....	14	1230
Sandstone, "Berea"—oil smell .....	22	1252
Shale—oil smell .....	10	1262
Sandstone—oil smell .....	44	1306
<b>DEVONIAN SYSTEM</b>		
Shale, black and white—"Chattanooga".....	421	1737
Limestone—"Gordon" .....	10	1747
Shale, black and white .....	283	2030
Shale and "Sand"—gas .....	20	2050
Limestone, brown .....	50	2100
Total depth .....		2100

**WELL No. 7. (O. & G. Res., p. 222.)**

American Rolling Mill Co. (formerly Ashland Coal and Iron Co.), lessor. Location:  $\frac{3}{4}$  of a mile from Summit Station. Well started 52 feet above No. 6 coal and stopped just above the Devonian. Drilled about 1896 by Shea and McMullin for Ashland Coal and Iron Co., original lessor and operator. C. H. E. 778.5' A. T.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone and shale—"Pottsville" .....	675	675
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Big Lime" .....	60	735
Sandstone and shale—"Waverly" .....	590	1325
Shale, black—"Sunbury" .....	20	1345
Sandstone, "Berea"—gas .....	13	1358
Shale, dark .....	57	1415
Total depth .....		1415

**WELL No. 8. (O. F. Stratig., p. 63.)**

W. I. Ross, No. 1, lessor. Good Losers Oil and Gas Co., lessee (oil well No. 3 of lessee). Location: Near Mayhew P. O., Bolts Fork, Boyd County. Commenced: Oct. 1, 1920. Completed: Dec. 14, 1920. Initial production: 25 bbls. oil. C. H. E. 734.84' A. T.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil and shale .....	40	40
Sandstone .....	30	70
Shale and shells .....	60	130
Coal .....	3	133

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Limestone (shells) .....	7	140
Shale (red rock) .....	12	152
Shale, dark .....	100	252
Sandstone .....	75	327
Shale, light .....	40	367
Limestone, hard .....	13	380
Shale, dark .....	10	390
Sandstone, gray—(water at 400) .....	40	430
Shale and shells .....	120	550
Limestone, gray .....	25	575
Shale, dark .....	125	700
Sandstone, gray .....	30	730
Shale and shells .....	90	820
Sandstone, salt water .....	70	890
Shale, dark .....	25	915
Sandstone, white .....	85	1000
MISSISSIPPIAN SYSTEM		
Limestone, gray—"Little Lime" .....	40	1040
Shale, dark .....	40	1080
Limestone, hard—"Big Lime" .....	105	1185
Shale, dark .....	35	1220
Limestone, gritty .....	60	1280
Sandstone, gray .....	40	1320
Limestone, hard .....	10	1330
Shale, "Waverly" .....	250	1580
Shale and shells .....	150	1730
Shale, brown (Sunbury) .....	27	1757
Sandstone, "Berea" (oil at 20 ft in sandstone. Used 20 qts. nitroglycerine).....	35	1792
Shale, dark .....	32	1824
Sandstone, "Berea" (all carried oil, used 20 qts. nitroglycerine) .....	6	1830
Shale .....	36	1866
Total depth .....		1866

## WELL No. 9. (O. F. Stratig., p. 64.)

John Murphy, No. 1, lessor. Murphy Oil & Gas Co., lessee. Location: East side of A. C. & I. Ry. Co. tunnel, just west of Ashland, at Pollard. Commenced: Sept. 14, 1912. Completed: November 15, 1912. Initial production: 500,000 cu. ft. gas. Drilled by Murphy and Abrams. J. L. Gussler, contractor. Authority: C. E. Bales. Production 1924, 80,000 ft. natural gas is reported. Used in Ashland, Ky. C. H. E. 626.30' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	11	11
PENNSYLVANIAN SYSTEM		
Sandstone .....	70	81
Fire clay .....	9	90
Shale .....	50	140
Sandstone .....	10	150
Shale (fresh water set 8¼" casing at 180) ..	290	440
"Salt Sand" .....	20	460
Shale, blue .....	30	490
Limestone, sandy .....	18	508
Sandstone, "Salt sand"—gas .....	60	568
MISSISSIPPIAN SYSTEM		
Limestone .....	37	605
Limestone, sandy .....	30	635
Shale, white .....	15	650
Sandstone .....	90	740
Limestone, sandy (salt water) .....	92	832
Shale, soft and muddy .....	8	840
Shale (set 6½" casing at 885) .....	25	865
Sandstone .....	45	910
Shale .....	347	1257
Shale, "Sunbury" .....	15	1272
Sandstone .....	5	1277
Sandstone, "Berea" (show of oil) .....	15	1292
Shale and sandstone .....	23	1315
Sandstone, gray—gas .....	33	1348
Shale, blue .....	35	1383
Shale (red rock) .....	11	1394
Shale, blue .....	15	1409
Shale, blue .....	176	1585
DEVONIAN SYSTEM		
Shale, black—"Chattanooga" .....	115	1700
Sandstone (fossil shells, gas) .....	5	1705
Shale, black—"Chattanooga" .....	200	1905
Sandstone (fossil shells, gas) .....	5	1910
Shale, black—"Chattanooga" .....	20	1930
Total depth .....		1930

## WELL No. 10. (O. F. Stratig., p. 66.)

Belle Ross, No. 1, lessor. Good Losers Oil Co. (oil well No. 2, of lessee). Location: Near Mayhew P. O. on Bolts Fork, in Boyd County, just north of Lawrence County line, and about 4½ miles east



## A DRILLING ON INDIAN RUN

This well is located on the J. L. Stanley farm. It was drilled in October, 1924, by Wm. Foreman.

of Denton, Carter County. Commenced: June 25, 1920. Completed: Aug. 20, 1920. Initial production: 15 bbls. oil. C. H. E. 685.6' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	20	20
PENNSYLVANIAN SYSTEM		
Shale, black .....	65	85
Sandstone and limestone .....	170	255
Shale, white and brown .....	125	380
Sandstone—(show of gas) .....	30	410
Sandstone and shale .....	170	580
Shale, black .....	200	780
Sandstone, white .....	175	955
Shale, black .....	15	970
MISSISSIPPIAN SYSTEM		
Limestone, "Big Injun" .....	105	1075
Shale, white .....	108	1183
Sandstone, white—(salt water) .....	30	1213
Shale, "Waverly" .....	424	1637
Shale, black "Sunbury" .....	20	1657
Sandstone, "Berea"—oil .....	44	1701
Shale, black .....	8	1709
Sandstone, dark .....	4	1713
Shale, black .....	5	1718
Sandstone, "Bedford"—oil .....	26	1744
Shale, black .....	7	1751
Total depth .....		1751

## WELL No. 11. (O. F. Stratig., p. 67.)

Clara Williams, No. 1, lessor. Location: 1¼ miles west of Lockwood Station, Ky. Drilling commenced: April 12, 1920. Completed: July 1, 1920. Authority: H. R. Levick, Jr., Supt. Production: Dry. C. H. E. 663.1 A. T.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale and shell .....	400	400
Sandstone—(cow run) .....	50	450
Sandstone—(cow run)—(second) .....	50	500
Sandstone—(salt sand) .....	610	1110
Shale .....	10	1120
<b>MISSISSIPPIAN SYSTEM</b>		
Sandstone—"Maxon" .....	50	1170
Limestone—"Big Lime" .....	122	1292
Shale, red and blue .....	40	1332
Sandstone—"Big Injun"—(3 bbls. of water in 24 hrs. at 50 ft.) .....	200	1532
Shale and shells .....	326	1858
Shale, black—"Sunbury" .....	30	1888
Sandstone—"Berea" sand .....	42	1930
Total depth .....		1930

## WELL No. 12, (O. F. Stratig., p. 68.)

Huntington Gas & Development Co., Huntington, W. Va., No. 1, lessee. Location: At Lockwood Station, near Big Sandy River and C. & O. R. R. right of way, Boyd County, Ky. Drilled about 1916. Production: Dry. Authority: J. C. McCarthy, Ashland, Ky. C. H. E. 551.0' A. T.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	46	46
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone .....	39	85
Shale .....	10	95
Sandstone .....	10	105
Shale .....	20	125
Sandstone .....	65	190
Shale .....	10	200
Sandstone .....	20	220
Shale .....	20	240
Sandstone .....	60	300
Shale .....	227	527
Sandstone .....	15	542
Shale .....	274	816

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone—"Salt sand" .....	224	1040
Coal .....	2	1042
Shale .....	18	1060
MISSISSIPPIAN SYSTEM		
Sandstone—"Maxon" .....	22	1082
Shale .....	2	1084
Limestone—"Big Lime" .....	111	1195
Shale .....	10	1205
Sandstone—"Big Injun" .....	175	1380
Shale .....	21	1401
Shale and shells .....	417	1818
Sandstone—"Berea" .....	44	1862
Shale and shells .....	40	1902
DEVONIAN SYSTEM		
Shale, black—"Chattanooga" .....	758	2660
Shale—"Chattanooga" .....	86	2746
Limestone—"Sand"—"Ragland" .....	34	2780
SILURIAN AND ORDOVIAN SYSTEMS		
Limestone .....	625	3405
Shale .....	25	3430
Limestone (red rock) .....	75	3505
Shale, black .....	95	3600
Limestone—shell .....	5	3605
Limestone (red rock) .....	25	3630
Shale, black .....	15	3645
Limestone, hard—shell .....	4	3649
Shale and sandstone—shell .....	41	3690
Shale .....	5	3695
Limestone—(red rock) .....	5	3700
Shale, black .....	15	3715
Limestone .....	20	3735
Sandstone—broken .....	15	3750
Shale, black .....	37	3787
Total depth .....		3787

Note:—The base of the Devonian, all of the Silurian and the top of the Ordovician occur near the top of the 625 feet of limestone above 3,405 feet in depth.

#### WELL No. 13.

John Horn, No. 1, lessor. Drilled for the Ashland Iron and Mining Company, original lessee, by J. C. McCarthy, now (1924) American Rolling Mill Co. (No. 2 gasser), Ashland Ky. Rig commenced, Feb. 6, 1917. Completed, Feb. 19, 1917. Drilling commenced, Feb. 20, 1917.



Completed, May 30, 1917. Production in March, 1924, 75,000 cu. ft. natural gas. C. H. E. 532.9' A. T. Authority: J. C. McCarthy, Ashland, Ky.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	12	12
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone .....	13	25
Fire clay .....	30	55
Shale .....	245	300
Sandstone .....	10	310
Shale .....	30	340
Sandstone—"Salt sand" .....	66	406
Shale, black .....	22	428
<b>MISSISSIPPIAN SYSTEM</b>		
Sandstone—"Maxon" .....	17	445
Limestone—"Little lime" .....	19	464
Shale—"Pencil Cave" .....	56	520
Limestone—"Big lime" .....	30	550
Shale, black .....	10	560
Sandstone—water .....	185	745
Shale, black .....	401	1146
Sandstone—"Wier" .....	31	1177
Shale, black—"Sunbury" .....	10	1187
Sandstone—"Berea" .....	44	1231
Shale, white .....	84	1315
<b>DEVONIAN SYSTEM</b>		
Shale, brown } .....	60	1375
Shale, black } .....	125	1500
Shale, brown } .....	160	1660
Shale, gray } "Ohio" { .....	10	1670
Shale, brown } .....	20	1690
Shale, black } .....	10	1700
Shale, brown } .....	35	1735
Shale—"Gordon" .....	69	1804
Shale, brown .....	36	1840
Shale, white .....	133	1973
Limestone—"Corniferous" .....	512	2485
Shale, black .....	20	2505
<b>SILURIAN SYSTEM</b>		
Limestone—(red rock) .....	150	2655
Shale, white .....	40	2695
Shale, pink .....	57	2752
Shale, black .....	18	2770
Limestone—(red rock) .....	14	2784
Limestone—"Sand"—"Clinton" 2 .....	10	2794

Strata	Thickness	Depth
<b>SILURIAN SYSTEM</b>		
Shale and shells .....	91	2885
Limestone—(red rock) .....	45	2930
Shale, blue .....	6	2936
Total depth .....		2936

Wood conductor 13'; 10" casing 205; 8¼" casing 495; 6⅝" casing 1194; 3" tubing 2285. 8¼" casing pulled.

Remarks:—Show of gas "salt sand" 390. Gas in Berea at 1162. Showing of oil 2049. Gas at 2058.

Water:—Fresh water 2 bbls. hr. 285 ft. Salt water at 350. Hole full of salt water at 400. Water, "Berea Grit" 1150½ bbls. per hr.

#### WELL No. 14.

Open Hearth Well No. 1. Drilled for the Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Owned by American Rolling Mill Co. (No. 3). Rig commenced. July 17, 1917. Completed, July 23, 1917. Drilling commenced, July 23, 1917. Completed, Oct. 5, 1917. Production: Dry, abandoned. Authority: J. C. McCarthy. C. H. E. 537.4' A. T.

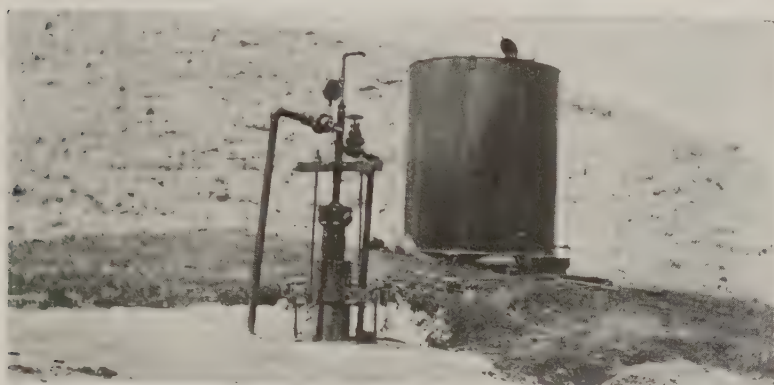
Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	12	12
<b>PENNSYLVANIAN SYSTEM</b>		
Shale—soft .....	13	25
Shale, black .....	15	40
Sandstone—very soft .....	8	48
Gravel—fresh water .....	10	58
Shale, black .....	52	110
Shale, white .....	2	112
Shale, black .....	21	133
Coal .....	2	135
Sandstone, white .....	65	200
Mud, blue .....	8	208
Shale .....	167	375
Limestone—(red rock)—show of gas 380..	40	415
Sandstone—"Salt sand"—salt water 430.....	20	435
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Little lime" .....	15	450
Shale—"Pencil Cave" .....	2	452
Limestone—"Big lime" .....	128	580
Shale .....	20	600
Sandstone—"Big Injun" .....	70	670
Shale .....	468	1138

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, brown—"Sunbury" .....	16	1154
Sandstone—"Berea" .....	30	1184
Shale .....	6	1190
Sandstone—Bedford .....	46	1236
Shale .....	56	1292
DEVONIAN SYSTEM		
Shale, brown	98	1390
Shale .....	15	1405
Shale, brown	25	1430
Shale .....	60	1490
Shale, brown	10	1500
Shale .....	10	1510
Shale, brown	230	1740
Shale—"Gordon Sand" .....	40	1780
Shale .....	60	1840
Shale, brown .....	155	1995
Limestone—"Corniferous"—show of oil		
2085; show of gas 2090; salt water 2100	129	2124
Total depth .....		2124

## WELL No. 15.

Westwood Real Estate and Development Co., No. 1, lessor. Drilled for the Ashland Iron and Mining Company, by J. C. McCarthy. Now owned by the American Rolling Mill Company (No. 4), Ashland, Ky. Rig commenced, Nov. 27, 1917. Completed, Dec. 5, 1917. Drilling commenced, Dec. 27, 1917. Completed, April 23, 1918. C. Head Alt. 545.40 ft. A. T. Production: March, 1923, 106,000 cubic feet natural gas. Authority for log, J. C. McCarthy, Ashland, Ky.

Strata	Thickness	Depth
RECENT		
Soil .....	38	38
PENNSYLVANIAN SYSTEM		
Shale .....	30	68
Shale—fresh water 140 .....	285	323
Sandstone .....	15	338
Shale—salt water 424 .....	20	358
Sandstone—"Salt sand" .....	66	424
Shale, black .....	24	448
Sandstone "Maxon"—salt water .....	16	474
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime" .....	12	486
Shale—"Pencil Cave" .....	4	490
Limestone—"Big lime" .....	30	520
Shale, black .....	10	530



## A HOODS CREEK GASSER

This well is the B. F. Lucas No. 1 and is located  $\frac{1}{2}$  mile north of Summit Station, Boyd Co., Ky.

Strata	Thickness	Depth	
MISSISSIPPIAN SYSTEM			
Sandstone, white .....	127	657	
Shale .....	509	1166	
Sandstone—"Berea"—salt water 1180.....	30	1196	
Shale .....	6	1202	
Sandstone—"Berea" .....	50	1252	
Shale .....	98	1350	
DEVONIAN SYSTEM			
Shale, brown—gas 1217 .	} "Chattanooga" Gas 1660	25	1375
Shale .....		125	1500
Shale, brown .....		100	1600
Shale .....		60	1660
Limestone—sandy .....		5	1665
Shale, brown .....		90	1755
Limestone and shells .....		5	1760
Shale, brown—gas 1685 .....		100	1860
Shale, white .....		140	2000
Shale, brown .....		7	2007
Limestone—"Corniferous" ..		15	2022
Total depth .....			2022

Wood conductor 16'; 12 $\frac{1}{2}$ " 34' 6"; 10" casing 212' 8"; 8 $\frac{1}{4}$ " casing 468' 2"; 6 $\frac{5}{8}$ " casing 1218' 4"; 3" tubing 1996' 9"; 8 $\frac{1}{4}$ " casing pulled  
Lost bit stem and jars in hole.

**WELL No. 16.**

Bellefonte Brick Co., No. 1, lessor. Location: Bellefonte farm.  
Drilled for Ashland Iron and Mining Company (Armco No. 5), lessee,

by J. C. McCarthy. Rig commenced Oct. 10, 1917. Completed Oct. 23, 1917. Drilling recommenced Oct. 24, 1917. Completed Feb. 23, 1918. Production: Small show of gas in "Berea" and "Gordon" sands; abandoned. Well abandoned. C. H. E. 577.0' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	14	14
PENNSYLVANIAN SYSTEM		
Shale .....	6	20
Coal .....	2	22
Sandstone .....	56	78
Shale, soft, blue .....	71	149
Sandstone, white—fresh water 175 .....	35	184
Shale, soft, blue .....	31	215
Sandstone, white .....	5	220
Shale, black .....	38	258
Sandstone .....	7	265
Shale .....	5	270
Sandstone .....	20	290
Shale .....	10	300
Sandstone—"Salt sand"—gas 310' .....	150	450
Shale .....	2	452
MISSISSIPPIAN SYSTEM		
Limestone, "Little lime" .....	15	467
Shale, "Pencil Cave" .....	3	470
Limestone, "Big lime" .....	50	520
Shale .....	95	615
Sandstone .....	145	760
Shale .....	398	1158
Sandstone .....	26	1184
Shale—"Sunbury"—salt water .....	7	1191
Sandstone—"Berea"—show of gas 1195'.....	109	1300
DEVONIAN SYSTEM		
Shale, brown .....	25	1325
Shale and shells .....	432	1757
Limestone—"Gordon" .....	25	1782
Shale, brown .....	28	1810
Limestone, brown .....	40	1850
Shale, white .....	131	1981
Limestone—"Corniferous" .....	210	2191
Total depth .....		2191

Conductor 14'; 10" casing 210' 1"; 8¼" casing 467'; 6½" casing 1231' 8"; 5 3/16" casing 1770' 11". All casing pulled except wood conductor and 10".

## WELL No. 17.

C. H. & Otis Willis, Well No. 1, lessor. Drilled for Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Now property of American Rolling Mill Co., Ashland, Ky. Location:  $\frac{1}{4}$  mile north of C. & O. R. R. right of way  $8\frac{1}{2}$  miles west of lower part of Ashland, Ky. Rig commenced May 14, 1918. Completed May 25, 1918. Drilling recommenced June 6, 1918. Completed July 3, 1918. Production: Natural gas, April, 1924, 281,000 cu. ft. C. H. E. 563.63 feet A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	10	10
PENNSYLVANIAN SYSTEM		
Fire clay .....	5	15
Shale .....	25	40
Coal .....	2	42
Shale .....	38	80
Sandstone—fresh water .....	10	90
Shale .....	30	120
Shale, soft, blue .....	30	150
Shale .....	10	160
Coal .....	2	162
Shale .....	26	188
Coal .....	2	190
Shale .....	175	365
Sandstone—"Salt sand"—water 470' .....	115	480
Shale .....	9	489
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime" .....	18	507
Shale—"Pencil Cave" .....	2	509
Limestone—"Big lime" .....	116	625
Shale .....	557	1182
Shale, brown—"Sunbury" .....	20	1202
Sandstone, "Berea" .....	26	1228
Shale .....	6	1234
Sandstone—"Berea"—gas at 1236' .....	35	1269
DEVONIAN SYSTEM		
Shale .....	131	1400
Shale, brown .....	240	1640
Limestone, shells—show of gas .....	5	1645
Shale .....	159	1804
Shale, brown .....	54	1858
Limestone, black—gas .....	12	1870
Shale .....	45	1915



Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone, shell—gas .....	5	1920
Shale, white .....	114	2034
Limestone—"Corniferous."		
Total depth .....		2034
Conductor 32'; 10" casing 199' 6"; 8¼" casing 531' 11"; 6⅝" casing 1244'; 3" tubing 2056' 11"; 8¼" casing pulled 531' 11".		

## WELL No. 18.

Wheatley and Seaton, Well No. 1, lessor. Location: One mile west of Ashland, Ky. Drilled for Ashland Iron and Mining Company (Armco No. 7), lessee, by J. C. McCarthy of Ashland, Ky. Rig commenced Aug. 1, 1918. Completed Aug. 17, 1918. Drilling commenced Aug. 20, 1918. Completed Oct. 28, 1918. Production: This well made when flush, 2 bbls. oil for 30 days actual pumping, and 150,000 cu. ft. gas. C. H. E. 650.0' A. T. Authority for log, J. C. McCarthy, Ashland, Ky.

Strata	Thickness	Depth
RECENT		
Soil .....	22	22
PENNSYLVANIAN SYSTEM		
Sandstone .....	23	45
Shale .....	45	90
Coal .....	2	92
Shale .....	33	125
Fire clay .....	5	130
Coal .....	5	135
Shale .....	20	155
Sandstone—water .....	55	210
Shale, black—10" casing .....	5	215
Shale and shells .....	185	400
Sandstone .....	20	420
Shale .....	15	435
Sandstone—"Salt sand"—salt water 450-480	95	530
Shale, black .....	20	550
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime"—8¼ casing 568' ...	110	660
Shale .....	20	680
Sandstone .....	40	720
Shale .....	40	760
Sandstone .....	40	800
Shale .....	20	820
Sandstone .....	30	850
Shale and shells .....	405	1255

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, brown—"Sunbury" .....	15	1270
Sandstone—"Berea" .....	28	1298
Shale .....	8	1306
Sandstone—"Berea" 6½" casing 1339' .....	79	1385
Shale, pink .....	25	1410
<b>DEVONIAN SYSTEM</b>		
Shale, brown .....	110	1520
Shale, gray .....	30	1550
Limestone, shells .....	10	1560
Shale, brown .....	222	1782
Shells .....	18	1800
Limestone, shells—show of gas .....	20	1820
Shale, white .....	15	1835
Shale, brown .....	65	1900
Shale, red .....	45	1945
Sandstone, "Gordon"—show of gas .....	25	1970
Shale, white .....	65	2035
Limestone, shells .....	5	2040
Shale, white .....	56	2096
Limestone—"Corniferous" gas and oil 2166' .....	158	2254
Total depth .....		2254
Well shot with 80 quarts.		
Wood conductor 22'; 10" casing 220'; 8¼" casing 569' 7"; 6½" casing 1334'. 8¼" casing pulled 569' 7".		

**WELL No. 19.**

C. J. Bocklage, Well No. 1, lessor. Drilled for Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Now property of American Rolling Mill Co. (No. 8). Rig commenced Aug. 16, 1918. Completed Aug. 22, 1918. Drilling recommenced Aug. 29, 1918. Completed Oct. 12, 1918. Production: Original, 250,000 cu. ft. gas. In April, 1924, this well produced 125,000 cu. ft. natural gas. C. H. E. 575.0 feet A. T.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	10	10
<b>PENNSYLVANIAN SYSTEM</b>		
Clay .....	5	15
Sandstone—rock .....	3	18
Quick sand .....	2	20
Shale .....	40	60
Sandstone—fresh water 77' .....	40	100
Shale .....	150	250
Mud, blue .....	100	350

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone—"Salt sand"—water at 470'.....	130	480
Shale .....	47	527
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Little lime" .....	10	537
Shale—"Pencil Cave" .....	4	541
Limestone—"Big lime" .....	259	800
Shale, white .....	415	1215
Shale, brown—"Sunbury" .....	10	1225
Sandstone—"Berea" .....	30	1255
Shale—gas 1270' .....	7	1262
Sandstone—"Berea" .....	50	1312
Shale .....	88	1400
<b>DEVONIAN SYSTEM</b>		
Shale, brown } "Ohio". { .....	100	1500
Shale .....	260	1760
Shale, blue—gas at 1760' .....	5	1765
Shale .....	115	1880
Shale, brown } "Chattanooga" { .....	88	1968
Shale, white } .....	97	2065
Limestone—"Corniferous"—oil and gas show 2155' .....	134	2199
Total depth .....		2199

Drive pipe  $13\frac{1}{2}$ " 20'; casing 10" 175' 4";  $8\frac{1}{4}$ " 566'; casing 1274' 3"; tubing 2040'.

#### WELL No. 20.

B. Shields, Well No. 1, lessor. Location: Western suburbs of Ashland, Ky., in Midland Heights addition. Drilled for Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Now property of American Rolling Mill Co. (No. 9). Rig commenced Nov. 21, 1918. Completed Dec. 10, 1918. Started spudding Dec. 12, 1918. Well completed to 2178' Feb. 13, 1919. Well finished through "Clinton" sandstone June 12, 1919, at 3052'. Production: Natural gas, in April was 50,000 cu. ft. C. H. E. 606.88 feet A. T.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	12	12
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, rock—fresh water at 18' .....	8	20
Fire clay .....	20	40
Shale, black .....	15	55
Coal—hole full of water .....	5	60
Shale .....	15	75

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, soft, blue .....	150	225
Shale, black .....	125	350
Sandstone, white .....	50	400
Shale, black .....	85	485
Sandstone, "Salt sand" white—Big water at 500' .....	43	528
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Big lime" .....	94	622
Shale, black .....	158	780
Sandstone, white .....	290	1070
Limestone, gray—shells .....	30	1100
Shale, black .....	113	1213
Shale, brown—"Sunbury" .....	15	1228
Sandstone—"Berea"—gray .....	27	1255
Shale, black .....	10	1265
Sandstone—"Berea"—gas at 1290' .....	60	1325
Shale, sandy (red rock) .....	30	1355
<b>DEVONIAN SYSTEM</b>		
Shale, brown—"Chattanooga" .....	245	1600
Shale, white .....	20	1620
Shells, brown—show of gas 1700' .....	157	1777
Shale, white .....	21	1798
Limestone, brown .....	24	1822
Shale, white .....	8	1830
Shale, brown .....	90	1920
Shale, white .....	148	2068
Limestone—"Corniferous"—gas at 2155' .....	97	2165
<b>SILURIAN SYSTEM</b>		
Limestone—"Niagran" .....	429	2594
Shale, pink, red—water at 2178' .....	274	2868
Limestone, "Clinton"—light gray—reduced hole to 5 3/16 at 2576' .....	10	2878
Shells, gray .....	90	2968
Shale, dark red .....	84	3052
Total depth .....		3052

Wood conductor 12'; 10" casing, 9 joints 176'; 8" casing, 26 joints 548'; 658" casing, 61 joints 1258'.

Note:—The Devonian-Silurian contact, as indicated, is conjectural.

#### WELL No. 21.

Ashland Fire Brick Co., lessor and lessee. Well No. 1. Location: Ashland Fire Brick Company yards, at Ashland, Ky. Drilled: April, 1912. Production: Natural gas, at 1373 ft. C. H. E. 557.3' A. T.

Strata	Thickness	Depth
RECENT		
Sand, gravel .....	15	15
Drive pipe .....	70	85
PENNSYLVANIAN SYSTEM		
Shale, blue .....	265	350
Sandstone—water .....	25	375
Sandstone .....	30	405
Sandstone—salt water .....	50	455
Sandstone—no salt .....	75	530
Shale, blue .....	10	540
MISSISSIPPIAN SYSTEM		
Limestone .....	55	595
Shale .....	65	660
Sandstone—"Big Injun" .....	45	705
Shale .....	490	1195
Shale—"Sunbury"—show of oil .....	22	1217
Shale .....	8	1225
Sandstone .....	30	1255
Sandstone, natural gas } "Berea" .....	18	1273
Gas .....	17	1290
Total depth .....		1290
8¼" casing 169 ft. 6½" casing 540 ft. 5" casing 737 ft.		

## WELL No. 22.

Ashland Steel Co., lessor and lessee. Location: Ashland Steel Company's yards, close to Ohio River, Ashland, Ky. Production: Dry. C. H. E. 546.4' A. T.

Strata	Thickness	Depth
RECENT		
Soil—sand—(10" casing) .....	74	74
PENNSYLVANIAN SYSTEM		
Sandstone, shale (8¼" casing) .....	236	310
Sandstone .....	148	458
Sandstone—salt water .....	60	518
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime" .....	16	534
Shale—"Pencil Cave" .....	5	539
Limestone—"Big lime" .....	56	595
Shale .....	65	660
Sandstone .....	10	670
Sandstone, water } "Big Injun" .....	40	710
Shale—5" casing .....	20	730
Shale and shells—"Waverly" .....	510	1240
Sandstone—"Berea"—little water .....	5	1245

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale (15 ft. break, 3 ft. gas).....	18	1263
Sandstone—no pay .....	25	1288
Sandstone—of pay .....	10	1298
Sandstone .....	2	1300
Shale, white .....	1	1301
Total depth .....		1301

Note:—Cased in "Big lime" at 553 A 5-foot break occurs at 570. Packer to be set 46 ft. above bottom. This record seems to have been poorly kept.

## WELL No. 23.

J. C. Riffe, No. 1, lessor. Good Losers Oil & Gas Co., lessee. Location:  $\frac{1}{2}$  mile southwest of Mayhew P. O., Bolts Fork, Boyd Co., Ky. Commenced March 24, 1920. Authority: John Diedrich, Ashland, Ky. C. H. E. 703.27 feet A. T.

Strata	Thickness	Depth
RECENT		
Soil, clay (35' of 10" casing) .....	35	35
PENNSYLVANIAN SYSTEM		
Shale .....	65	100
Sandstone—broken .....	175	275
Shale, white and brown .....	125	400
Sandstone, white—gas .....	30	430
Shale, broken sand .....	170	600
Shale, black .....	200	800
Sandstone, white—gas .....	175	975
Shale, black—6 $\frac{5}{8}$ " casing .....	15	990
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime" .....	132	1122
Shale, white .....	108	1230
Sandstone, white—"Big Injun" .....	30	1260
Shale—"Waverly" .....	440	1666
Shale, black—"Sunbury" .....	20	1686
Sandstone—"Berea"—oil 14 ft in "sand"....	47	1733
Shale, black .....	9	1742
Sandstone, dark .....	5	1747
Shale .....	6	1753
Sandstone—"Berea" .....	23	1776
Shale .....	7	1783
Total depth .....		1783

Note:—Should be cased through the "Big Injun" sand, as this sand contains salt water in this locality. Should be 125 ft. of 8 inch used to cut off the upper water and cave.



## WELL No. 24.

Crit Ross, No. 1, lessor. Good Losers Oil Co., lessee. Location: Southern Boyd County,  $\frac{1}{2}$  mile east of Mayhew on Bolts Fork. Partial record only. Authority: John Diedrich. C. H. E. 684.9' A. T.

Strata	Thickness	Depth
<b>PENNSYLVANIAN AND MISSISSIPPIAN SYSTEMS</b>		
Sandstone, limestone and shale .....	1757	1757
Sandstone—"Berea" .....	35	1792
Shale .....	32	1824
Sandstone—"Berea" .....	6	1830
Shale .....	26	1836
Total depth .....		1836

## WELL No. 25. (O. &amp; G. Res. p. 222.)

Longabaugh, No. 1, lessor. Location: 600 feet southeast of Winslow Station, 2 miles west of Ashland, Ky. This is an old well, the location of which is now entirely obliterated. It produced a very small amount of natural gas according to report. The level of the ground at the exact location in a garden is 586.0' A. T.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	14	14
<b>PENNSYLVANIAN SYSTEM</b>		
Shale .....	10	24
Sandstone, white .....	38	62
Shale .....	28	90
Sandstone .....	48	138
Shale .....	38	176
Sandstone .....	20	196
Shale, black .....	110	306
Sandstone—salt water .....	83	389
Shale .....	15	404
Sandstone .....	20	424
Shale .....	15	439
Sandstone—salt water .....	61	500
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Big lime" .....	50	550
Shale and sandstone—salt water at 698.....	532	1082
Total depth .....		1082

## WELL No. 26.

J. F. Hutchinson, No. 1, lessor. Summit Gas & Oil Co., lessee. Location: On the head of Hood's Creek, at Summit Station just north

of C. & O. R. R., five miles west of Ashland, Ky. Commenced April 15, 1924. Completed June 20, 1924. Drilled by Forman and Hurt, for the Summit Gas & Oil Co. Authority: W. R. Forman. Production: 5 bbls. oil per day on pump and 250 cu. ft. natural gas. C. H. E. 624.9' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	17	17
PENNSYLVANIAN SYSTEM		
Shale .....	73	90
Sandstone, gray .....	30	120
Shale, blue .....	12	132
Sandstone .....	12	144
Shale, white .....	10	154
Coal .....	4	158
Shale, white .....	15	173
Sandstone .....	35	208
Shale, blue .....	82	290
Sandstone, white .....	20	310
Shale .....	45	355
Sandstone, white .....	30	385
Shale .....	45	430
Sandstone—"salt sand" .....	50	480
Shale .....	6	486
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime" .....	59	545
Shale, brown .....	24	569
Limestone, blue .....	6	575
Shale, white .....	15	590
Sandstone—"Big Injun"—(water at 630)....	95	685
Shale .....	7	692
Limestone, shells .....	8	700
Sandstone, blue .....	43	743
Limestone, shells .....	10	753
Sandstone, blue .....	17	770
Shale—"Waverly" .....	347	1117
Shale—"Sunbury" .....	13	1130
Sandstone—"Berea" .....	85	1215
DEVONIAN SYSTEM		
Shale, white .....	35	1250
Shale, brown—"Chattanooga" .....	94	1344
Shale, white .....	101	1445
Shale, brown—"Chattanooga" .....	145	1690
Shale, white .....	112	1802
Shale, brown—"Chattanooga" .....	13	1815
Shale, white .....	115	1930

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone—"Corniferous" .....	60	1990
Limestone—oil .....	15	2005
Limestone .....	8	2013
Limestone—oil .....	14	2027
SILURIAN SYSTEM		
Limestone .....	151	2178
Total depth .....		2178
Shot well with 120 qts. Production: Pumped 5 bbls. per day.		

## WELL LOG No. 27.

J. S. Patton, No. 1, lessor. Summit Gas & Oil Co., lessee. Location: On Keys Creek, Boyd Co., Ky., near city limits of Ashland and 1½ miles from Catlettsburg. Commenced: July 15, 1922. C. H. E. 548.7' A. T. Production: Original 500,000 cu. ft. gas drowned by strong flow of salt water due to small amount of casing.

Strata	Thickness	Depth
RECENT		
Soil .....	15	15
PENNSYLVANIAN SYSTEM		
Clay .....	5	20
Sandstone .....	5	25
Sand .....	18	43
Fire clay .....	7	50
Coal .....	3	53
Shale .....	7	60
Sandstone .....	40	100
Shale .....	150	250
Fire clay .....	100	350
Shale .....	130	480
Sandstone (salt sand), salt water, gas.....	45	525
MISSISSIPPIAN SYSTEM		
Shale .....	2	527
Limestone .....	10	537
Sandstone, black .....	4	541
Sandstone, gray .....	33	574
Limestone (Big lime) .....	226	800
Shale, white .....	415	1215
Shale brown .....	10	1225
Shale, black (Sunbury) .....	37	1262
Sandstone (Berea), show of oil .....	36	1298
Sandstone (Berea), black, coarse,—oil, gas, water .....	6	1304
Shale, limey, black .....	57	1361
Shale .....	89	1450

Strata	Thickness	Depth
<b>DEVONIAN SYSTEM</b>		
Shale, brown .....	100	1550
Shale, black .....	232	1782
Limestone, blue—gas .....	9	1791
Shale .....	112	1903
Shale, brown .....	185	2088
Sand, black—gas .....	17	2105
Sand, gray .....	45	2150
Limestone, sandy (Corniferous), gas at 2160 .....	31	2181
Total depth .....		2181

This well was drilled 2181 feet, gas was found in four different sands, the best gas was found at 2105 feet.

Good show of oil in the Berea sand at a depth of 1298 feet.

Packer was set 525 feet from bottom of hole, with a two-inch tubing to case the water off.

T. A. Malone, Contractor.

#### WELL No. 28.

James Lee Stanley, lessor. W. R. Forman, et al., lessees. Location: Head waters of Indian Creek, in Greenup County, Ky., 1½ miles from Boyd County line. Production: Small oil in Berea sand and small gas in Bedford. C. H. E. 676.6' A. T.

(Partial record.)

Strata	Thickness	Depth
<b>RECENT AND PENNSYLVANIAN SYSTEM</b>		
Soil, sandstone, shale and coals .....	487	487
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Big lime" .....	59	556
Sandstone and shale—"Waverly" .....	594	1150
Shale, black "Sunbury" .....	16	1166
Sandstone—"Berea"—oil .....	87	1253
Sandstone—"Bedford"—gas .....	8	1261
Incomplete depth .....		1261

#### WELL LOG No. 29.

W. H. Spears, No. 1, lessor. The American Rolling Mill Company, Ashland, Ky., No. 1, lessee. Location: 5 miles southwest of Catlettsburg, Ky., on Laurel Creek, Boyd County, Kentucky. Commenced: Sept. 23, 1924. Completed: Oct. 25, 1924. Casing head elevation 680.3 feet, A. T. John G. White, Ashland, Ky., contractor. Production: 3 bbls. oil and 250,000 cu. ft. natural gas.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	12	12
<b>PENNSYLVANIAN SYSTEM</b>		
Fire clay .....	3	15
Sandstone .....	11	26
Fire clay .....	2	28
Coal (water) .....	2	30
Sandstone .....	15	45
Quicksand (large, fresh water) .....	3	48
Shale, sandy .....	25	63
Coal .....	2	65
Shale, sandy .....	22	87
Sandstone .....	13	100
Shale, white .....	94	194
Sandstone .....	15	209
Shale, black .....	4	213
Sandstone .....	44	257
Shale, white, muddy .....	3	260
Sandstone .....	18	278
Coal .....	3	281
Shale, sandy .....	11	292
Shale, white, muddy .....	8	300
Shale, sandy .....	10	310
Shale, dark .....	65	375
Sandstone .....	42	417
Shale, black .....	13	430
Sandstone .....	28	458
Shale, dark .....	13	471
Sandstone .....	40	511
Shale, light, muddy .....	95	606
Sandstone, "Salt" .....	46	652
Shale .....	4	656
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Little lime" .....	12	668
Limestone—"Little lime"—broken .....	13	681
Sandstone, pebbles .....	36	717
Shale .....	5	722
Sandstone, pebbles .....	6	728
Fire clay (10" steel line) .....	1	729
Limestone—"Big Lime" .....	82	812
Sandstone—"Big Injun" .....	17	829
Red rock .....	4	833
Sand stone—"Squaw"—(Briney salt water at 875, 4 bbls. per hour) .....	127	960
Shale, sandy .....	60	1020
Shale, dark .....	112	1132

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, light .....	122	1254
Shale, sandy .....	22	1276
Shale, dark .....	117	1393
Shale, light .....	40	1433
Shale, brown—"Sunbury"—(steel line).....	18	1451
Sandstone—"Berea"—oil at 1451 .....	15	1466
Sandstone, broken—"Berea" .....	74	1540
<b>DEVONIAN SYSTEM</b>		
Shale, light .....	35	1575
Shale, black .....	90	1665
Shale, light .....	22	1687
Shale, black .....	15	1702
Fire clay .....	20	1722
Shale, white .....	63	1785
Shale, black .....	195	1980
Shale, gray .....	18	1998
Shale, black (gas 2029-2047) (steel line 2029) .....	69	2067
Shale, light .....	7	2074
Shale, white .....	56	2130
Shale, dark, sandy (steel line) .....	154	2234
Limestone—"Corniferous"—flinty, sandy lime (strong odor, oil) .....	25	2309
Limestone, oil at 2349 (steel line) .....	43	2352
Limestone, broken .....	70	2422
Total depth .....		2422

**WELL LOG No. 30.**

Albert Bartram, No. 1, lessor. American Rolling Mili Company, Ashland, Ky., No. 11 (W-2), lessee. Location: 5 miles S. W. of Catlettsburg, Ky., on head of left fork of Chaderick Creek, Boyd County, Ky. Casing head elevation 726.5 feet. Begun: Nov. 20, 1924. Completed: Jan. 25, 1925. John G. White, Ashland, Ky., contractor. Production: Small gas in Corniferous, well bungled in shooting, plugged and abandoned.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	8	8
<b>PENNSYLVANIAN SYSTEM</b>		
Sand .....	6	14
Fire clay .....	9	23
Shale, dark .....	6	29
Shale—"Red Rock" .....	4	33



Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Fire clay .....	17	50
Shale, dark .....	12	62
Fire clay .....	16	78
Lime .....	3	81
Sand, dark .....	29	110
Shale, muddy .....	9	119
Shale, light .....	20	139
Shale, muddy .....	27	166
Shale, dark .....	23	189
Shale, muddy .....	19	208
Coal—water .....	3	211
Shale, muddy .....	11	222
Sand, light—gas, 224 .....	11	233
Shale, dark .....	4	237
Shale, light .....	11	248
Sand, light .....	38	286
Shale, muddy .....	5	291
Sand, dark .....	49	340
Shale, light .....	33	373
Shale, muddy .....	8	381
Sand, dark .....	23	404
Sand, white (water) .....	32	436
Shale, muddy .....	93	529
Shale, gray .....	19	548
Shale, muddy .....	11	559
Sand, broken .....	3	562
Shale, muddy .....	58	620
Shale, muddy and lime .....	12	632
Shale, muddy .....	20	652
Sand, light .....	2	654
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Little Lime" .....	13	667
Shale, light .....	7	674
Sand, light .....	} Gas at 690 {	}
Shale, light (salt water) .....		
Shale, light (salt water) .....	45	750
Shale, dark, sandy .....	7	757
Shale, muddy .....	3	760
Sand, light .....	5	765
Shale, dark .....	2	767
Sand, light .....	17	784
Shale, dark (steel line run 793 feet, 8¼ inch casing) .....	6	790
Limestone .....	4	794
Shale, light .....	35	829
Limestone—"Big Lime" .....	76	905

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sandstone—"Big Injun"—(Salt water at 908, $\frac{3}{4}$ bbl. per hour).....	9	914
Shale, red .....	2	916
Sandstone—"Squaw Sand" .....	109	1025
Shale, dark sandy .....	85	1110
Shale, light .....	44	1154
Shale, dark .....	304	1458
Shale, broken .....	38	1496
Shale, brown (Sunbury) .....	19	1515
Sandstone (Berea) (steel line) .....		1515
Sandstone (Berea) .....	18	1533
Shale, dark sandy .....	4	1537
Sandstone .....	18	1555
Shale .....	3	1558
Sandstone (oil) .....	35	1593
Sandstone .....	2	1595
Shale, dark, sandy .....	3	1598
Limestone, shelly .....	10	1608
DEVONIAN SYSTEM		
Shale, light .....	14	1622
Shale, black .....	116	1738
Shale, gray .....	29	1767
Shale, black .....	8	1775
Shale, dark .....	63	1838
Shale, black .....	5	1843
Limestone, black (reduced hole from 8 to 6 $\frac{1}{2}$ at 1848) .....	8	1851
Shale, black, slightly calcareous .....	99	1950
Shale, brown .....	112	2062
Shale, light .....	12	2074
Shale, black .....	54	2128
Shale, light .....	27	2155
Shale, black .....	59	2214
Shale, light .....	8	2222
Fire clay .....	6	2228
Shale, light .....	31	2259
Fire clay .....	21	2280
Shale, light .....	19	2299
Shale, dark (steel line) .....	55	2354
Limestone—"Corniferous"—(Natural gas)..	96	2450
Total depth .....		2450

Note:—This well did not produce gas in the Devonian black shale. The Ashland gas sand producing in the nearby, W. H. Spears No. 1 well, on Laurel Creek was not recognized in this well.

## WELL No. 31.

J. M. Ross, No. 1, lessor. The American Rolling Mill Company, Ashland, Ky., No. 12 (W-3), lessee. Location: Eleven miles southeast of Ashland, Kentucky, on Marsn Fork of Little Sandy River, Boyd



Portable Rig on J. M. Ross Farm

County, Ky. 631.54' A. T. Commenced: Jan. 20, 1925. Completed: Feb., 1925. John G. White, Ashland, Ky., contractor. Production: Dry.

Strata	Thickness	Depth
RECENT		
Soil .....	10	10
PENNSYLVANIAN SYSTEM		
Shale .....	15	25
Sandstone (water) .....	40	65
Shale, light .....	10	75
Shale, dark .....	10	85
Shale, gray .....	5	90
Shale, light .....	10	100
Coal .....	1	101
Shale, light .....	23	124
Shale, sandy .....	36	160
Shale, light .....	29	189
Coal .....	2	191
Shale, dark (big water) .....	4	195
Shale, sandy .....	45	240
Shale, dark .....	35	275
Shale, light .....	25	300
Shale, sandy—gas at 321' .....	53	353
Shale, dark .....	127	480

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone .....	125	605
Shale, light—4" steel line .....	6	611
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone (Big Lime), 8¼ casing 637'.....	103	714
Shale, dark .....	5	719
Shale, dark—gas 719' to 725' .....	6	725
Limestone, white, sandy .....	6	731
Shale, dark .....	5	736
Shale, dark (red rock) .....	4	740
Sandstone (Big Injun) (salt water 832).....	116	856
Shale, light, 6½ casing 856' .....	14	870
Limestone, shells .....	28	898
Shale, light .....	7	905
Shale and shells .....	55	960
Shale, dark .....	220	1180
Shale, sandy .....	40	1220
Shale, light .....	85	1305
Shale (coffee) "Sunbury" .....	16	1321
Sandstone, Berea, show oil 1321' .....	20	1341
Shale, dark .....	3	1344
Sandstone—"Bedford"—gas at 1368' .....	77	1421
<b>DEVONIAN SYSTEM</b>		
Shale, black .....	189	1610
Shale, light .....	70	1680
Shale, black .....	195	1875
Shale, gray .....	15	1890
Shale, black .....	134	2024
Shale, white (still in white, show at 2075') .....	114	2138
Limestone (Corniferous) .....	194	2332' 6"
Total depth .....		2332' 6"

The above well was plugged as follows: Bridges at 2163, season plug three feet long to 2150, filled in nine feet to 2141, season plug three feet to 2138 corniferous limestone.

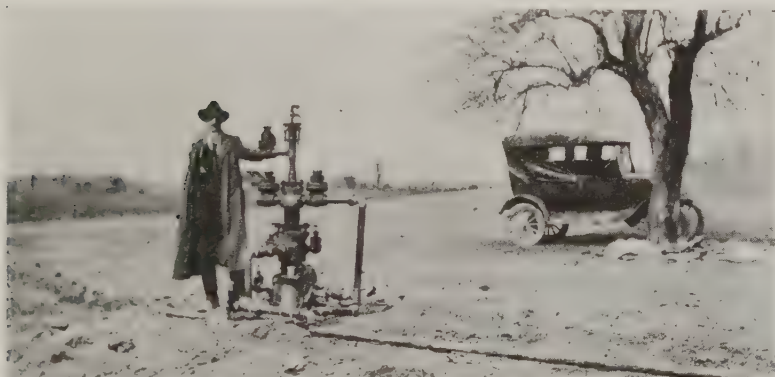
#### WELL No. 32.

Pat O'Brien, No. 1, lessor. The American Rolling Mill Co., Ashland, Ky., No. 13 (W-4), lessee. Location: Six miles south of Catlettsburg, Ky., on O'Brien Branch of Laurel Creek, Boyd County, Ky. Casing head elevation 678.2' A. T. Commenced: Feb. 16, 1925. Completed: March, 1925. Production: Small gas, plugged and abandoned. John G. White, Ashland, Ky., contractor.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil and gravel—wood conductor .....	8	8

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, blue .....	5	13
Sandstone .....	8	21
Fire clay .....	21	42
Coal (water) .....	1	43
Fire clay .....	17	60
Shale, sandy .....	23	83
Coal .....	2	85
Shale, light .....	7	92
Shale, dark .....	53	145
Sandstone .....	40	185
Shale, light .....	12	197
Sandstone .....	43	240
Shale, dark .....	5	245
Shale, light—big water 255' .....	34	279
Sandstone —10" casing 265' 2" .....	30	309
Shale, dark .....	10	319
Sandstone .....	8	327
Shale, dark .....	26	353
Shale, sandy .....	8	361
Sandstone .....	13	374
Shale, dark .....	23	397
Shale, light—gas 423' .....	26	423
Shale, light .....	29	452
Sandstone, gray .....	23	475
Shale, light .....	17	492
Shale, dark .....	30	522
Sandstone, white—little gas 525' .....	153	675
Shale, gray—little water 545 .....	5	680
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Big Lime"—big water 573'....	102	782
Limestone, brown—8¼" casing 726' 5½"....	20	802
Sandstone—"Big Injun"—engine gas 802'....	22	824
Shale—"Red Rock" .....	5	829
Sandstone—"Big Injun"—little water 884'....	113	942
Shale, sandy—948 ft., 6½" casing .....	78	1030
Shale, light—bottom hole packer and anchor	20	1050
Shale, dark—packer set at 827' .....	351	1401
Shale—"Sunbury" .....	19	1420
Sandstone "Berea" .....	15	1435
Sandstone, broken "Berea" .....	95	1530
<b>DEVONIAN SYSTEM</b>		
Shale, light .....	10	1540
Shale, brown .....	95	1635
Shale, light .....	20	1655
Shale, black .....	15	1670

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, light .....	35	1705
Shale, brown .....	240	1945
Shale, light .....	28	1973
Shale, brown .....	132	2105
Shale, light .....	141	2246
Limestone, Corniferous .....		2246
Total depth .....		2246



MASON NO. 1 GASSER, NEAR ASHLAND

This remarkable well produced from the Salt Sand, the Big Injun Sand, and the Ashland Gas Sand. It is one of the best gas wells in Boyd County, Ky.

## WELL No. 33.

John F. Mason, No. 1, lessor. The American Rolling Mill Co., Ashland, Ky., No. 14 (W-5), lessee. Location: Six miles from Ashland, Ky., on the Midland Trail, Boyd Co., Ky. Commenced: Feb. 19. Completed: March, 1925. 675.4' A. T. John G. White, Ashland, Ky., contractor. Production: Large gasser.

Strata	Thickness	Depth
RECENT		
Soil and gravel (wood conductor) .....	12	12
PENNSYLVANIAN SYSTEM		
Shale, blue—water enough to drill with.....	8	20
Fire clay .....	10	30
Sandstone, hard .....	8	38
Coal .....	2	40
Shale, dark .....	15	55
Shale, light .....	15	70
Shale, dark .....	30	100



Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, light .....	20	120
Coal .....	1	121
Shale, dark .....	29	150
Shale, light—big water 168' .....	85	235
Sandstone, dark—10" casing 265' 3½" .....	54	289
Shale, light—gas 309' .....	129	418
Sandstone, light—show oil 435' .....	85	503
Shale, dark—gas 418' to 436' .....	6	509
Sandstone—big water 454' .....	59	568
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone (Big Lime) 8¼" casing 447' 4" ..	92	660
Shale, dark—bottom hole packer .....	15	675
Sandstone (Big Injun)—6⅝", 611' bottom ..	128	803
Shale, light—hole packer .....	447	1250
Shale (coffee)—"Sunbury"—gas 654' .....	11	1261
Sandstone—"Berea" .....	25	1286
Shale—gas 1329' 6", show oil 1262' .....	8	1294
Sandstone—"Bedford" .....	54	1348
Shale, shells .....	27	1375
<b>DEVONIAN SYSTEM</b>		
Shale, brown—water in the engine 705, 20, 41 .....	90	1465
Shale, light .....	12	1477
Shale, brown .....	23	1500
Shale, light—gas 1400' in shale .....	50	1550
Shale, brown—gas 1742', Gordon No. 1.....	250	1800
Shale, light—gas 1808', Gordon No. 2.....	10	1810
Shale, brown—gas 1818' .....	55	1865
Shale, light—Ohio .....	15	1880
Shale, brown .....	68	1948
Shale, light .....	128	2076
Limestone—"Corniferous" .....	109	2185
Total depth .....		2185

Shot 60 quarts in Gordon No. 2 from 1806 to 1821 ft. Gas at 1329½ ft. Berea. Show of oil at 1262'. Good show of oil and gas at 2152' in the Corniferous. Plugged Corniferous in Armco No. 5 at 2087 and 2079 with two 3' seasoned plugs.

#### WELL No. 34.

Ben F. Lucas, No. 1, lessor. Summit Oil & Gas Co., lessee. Location: ½ mi. north of Summit Station on Hoods Creek, in Boyd County, Ky. Completed: Sept. 20, 1924. Production: Natural gas 150,000 cu. ft. and after shot, bailed. 36 bbls. of oil in 36 hours. Authority: W. R. Forman, driller. C. H. E. 602.1' A. T.

Strata	Thickness	Depth
RECENT		
Surface .....	6	6
PENNSYLVANIAN SYSTEM		
Shale, blue .....	10	16
Sandstone .....	20	36
Shale .....	69	105
Sandstone .....	15	120
Coal .....	2	122
Shale .....	20	142
Sandstone .....	20	162
Shale .....	98	260
Sandstone—sham gas .....	25	285
Shale .....	20	305
Limestone .....	5	310
Shale .....	25	335
Sandstone (conglomerate) .....	15	350
Shale .....	50	400
Salt, sand—water 415' .....	49	449
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	66	515
Shale, dark .....	5	520
Shale, sandy .....	5	525
Shale .....	5	530
Limestone, white.....	5	535
Sandstone—"Big Injun" .....	135	670
Shale .....	80	750
Shale—"Waverly" .....	337	1087
Shale—"Sunbury" .....	20	1107
Sandstone—"Berea"—(good gas 1170-1190) .....	95	1202
DEVONIAN SYSTEM		
Shale .....	34	1236
Shale .....	24	1260
Shale, white .....	140	1400
Shale, brown .....	70	1470
Shale, white .....	447	1917
Limestone (Corniferous sand), oil pay		
1994-2007 .....	85	2002
Total depth .....		2007

685 ft. of 6½" casing used. 200 ft. of 8" casing used. Devonian shale gas 1470'-1474'. Corniferous shot 2007' with 40 quarts glyc.

#### WELL No. 35.

George W. Fraley, No. 1, lessor. Summit Oil & Gas Co., lessee.  
Location: East side of Hoods Creek, 3,000 feet north of Summit Sta-

tion, Boyd County, Ky. Drilled: Feb., 1925. Driller: W. R. Forman.  
C. H. E. 606.7'. A. T. Production: 300,000 cu. ft. natural gas.

Strata	Thickness	Depth
RECENT		
Soil .....	17	17
PENNSYLVANIAN SYSTEM		
Shale, blue .....	19	36
Sandstone .....	24	60
Shale .....	45	105
Sandstone .....	15	120
Coal .....	2	122
Shale .....	20	142
Sandstone .....	20	162
Shale .....	98	260
Sandstone—"1st Salt Sand"—(gas) .....	25	285
Shale .....	20	305
Limestone .....	5	310
Shale .....	25	335
Sandstone .....	15	350
Shale .....	70	420
Sandstone—"2nd Salt Sand"—(water) .....	49	469
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	66	535
Shale, dark .....	5	540
Shale; red, sandy .....	5	545
Shale .....	5	550
Sandstone "Big Injun" .....	135	685
Shale .....	80	765
Shale—"Waverly" .....	337	1102
Shale—"Sunbury" .....	14	1116
Sandstone—"Berea" .....	91	1207
DEVONIAN SYSTEM		
Shale .....	29	1236
Shale .....	24	1260
Shale, white .....	140	1400
Shale, brown—"Ashland"—(gas 1540'-1546') .....	146	1546
Shale, white .....	374	1920
Limestone (Corniferous sand) .....	89	2009
Total depth .....		2009

Well shot Feb. 21, 1925. 700 ft. of 6½" casing. 185 ft. 8" casing.  
Small gas in salt sand. Gas in Berea, 12 ft. of "pay." Gas in brown  
Devonian shale. Oil, 1127' to 1135'. Gas, 1192' to 1202'. Oil show 1997'  
to 2009'.

## WELL No. 36.

Ike Fannin, No. 1, lessor. Kent Millis, et al., lessees. Location: Ike Fannin farm, on east side of Bear Creek back of Isaac Fannin house, one mile south of Poverty Gap road at Culbertson P. O., Ky. Kent Bolt, drilling contractor. Drilled in spring of 1920. Was not shot, would probably produce  $\frac{1}{2}$  bbl. had it been shot. Elevation top of casing 620.71' A. T. Elevation surface of ground, 619.88. 1345 ft. 6 $\frac{5}{8}$ " casing. Casing is removed, well plugged. 10" pipe remains. Authority: Kent Bolt, contractor.

Strata	Thickness	Depth
RECENT		
Surface clay .....	19	19
PENNSYLVANIAN SYSTEM		
Shale, red .....	26	45
Sandstone (water) .....	20	65
Shale, black .....	240	305
Sandstone (water) .....	25	330
Shale .....	120	450
Sandstone, show of oil .....	20	470
Shale, shell .....	330	800
Sandstone (salt sand) .....	70	870
Shale, black .....	120	900
Sandstone, settling, white .....	100	1000
Shale, black .....	20	1020
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	90	1110
Shale .....	35	1145
Sandstone, white—"Big Injun" .....	20	1165
Shale .....	565	1730
Shale, brown—"Sunbury" .....	17	1747
Sandstone and shale .....	32	1779
Sandstone—"Berea"—show of oil .....	12	1791
Sandstone, shale .....	56	1847
Total depth .....		1847

## WELL LOG No. 37.

J. H. Elam, No. 1, lessor. Petroleum Exploration Co., lessee. Location: On Cane Creek in Greenup County, Ky., about  $\frac{3}{8}$  mile north of the Carter County line and  $1\frac{5}{8}$  miles west of the Boyd County line. The well is reported to have produced some oil but was abandoned. No log appears to be available. Contractor: W. R. Formon, Ashland, Ky. C. H. E. 611.8' A. T.

## WELL No. 38.

## GREENUP COUNTY

A. Elam, No. 1, lessor. Petroleum Exploration Co., lessee. Location: Near Hunnwell P. O. on Cane Creek near county line. Commenced: July 24, 1922. Completed: Sept. 19, 1922. Contractor: C. P. Gordon & Sons. Drillers: Dougherty & Gordon. Well shot: Sept. 12th with 40 qts. from 1012 to 1049. 2-4½ shells used. C. H. E. 628.8' A. T. Production: Well tested out for 5 days after shot and tested 1 bbl. of oil.

Strata	Thickness	Depth
RECENT		
Soil .....	30	30
PENNSYLVANIAN SYSTEM		
Sandstone (soft) .....	30	60
Shale, blue .....	40	100
Shale .....	10	110
Sandstone, shaley .....	160	270
Shale, blue, soft .....	6	276
MISSISSIPPIAN SYSTEM		
Limestone, hard—"Big Lime" .....	49	325
Limestone, soft—"Big Lime" .....	50	375
Shale .....	15	390
Shale, hard .....	30	420
Limestone—"Big Injun" .....	298	718
Shale, dark .....	15	733
Sandstone—salt water—well was pulled out and plugged .....	20	753
Shale, dark .....	30	783
Shale, light .....	150	933
Shale, brown—"Sunbury" .....	16½	949½
Sandstone—"Berea" .....	94	1043½
Sandstone—"Berea"—oil 1012½-1027½ .....	94	1043½
Shale .....	6	1049½
Total depth .....		1049½

Casing record—Size	10	Feet	20	Left hole could not pull
Casing record—Size	8¼	Feet	54	Left hole could not pull
Casing record—Size	6⅝	Feet	490	Pulled out.

Shot Sept. 12th, 1922, 2-4½-20. 40 qts. Anchor 24.

## BOYD COUNTY

## LOG No. 39.

K. Towler, No. 1, lessor. Lessee unknown. Location: About 1,000 feet below mouth of Cobb Fork of Williams Creek, 1½ miles northwest of Princess, Boyd County, Ky. No log available. Well reported to have been about 650 feet deep. Drilled about 25 or 30 years ago. Produced

considerable gas, now flowing salt water. C. H. E. 589.6' A. T. Abandoned.

WELL No. 40.

Jack Arthur No. 1, lessor. Silver Run Oil Co., lessee. Location: 1½ miles up right fork of White's Creek nearly 2 miles due west of Savage P. O., Boyd Co., Ky. Production: Dry. C. H. E. 634.4' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	6	6
Gravel .....	22	28
PENNSYLVANIAN SYSTEM		
Shale, blue .....	37	65
Sandstone, white .....	15	80
Shale, black .....	30	110
Sandstone, dark .....	5	115
Shale, black .....	175	290
Sandstone .....	10	300
Shale (Red Rock) .....	15	315
Shale, white .....	30	345
Sandstone—"Cow Run" .....	40	385
Shale, dark .....	20	405
Second "Cow Run" .....	50	455
Shale, white .....	205	660
Sandstone, white .....	40	700
Shale, black .....	65	765
Sandstone—"Salt" .....	70	835
Shale, black .....	25	860
Sandstone, white .....	45	905
Shale, black .....	25	930
Sandstone, white .....	5	935
Shale, blue .....	4	939
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	40	979
Shale, blue .....	3	982
Limestone, white .....	37	1019
Limestone, sandy .....	16	1035
Shale, red and blue .....	25	1060
Sandstone—"Big Injun" .....	175	1235
Shale .....	424	1659
Shale, brown (Sunbury) .....	20	1679
Sandstone—"Berea"—water .....	42	1721
Shale .....	12	1733
Total depth .....		1733



## WELL No. 42.

Lacy Howard, No. 1, lessor. The American Rolling Mill Co., Ashland, Ky., No. 17 (W-8), lessee. Location: 1 mile south of Summit Station, and six miles from Ashland, Ky., 200 feet west of the Midland Trail, Boyd County, Kentucky. C. H. E. 695.30' A. T. Commenced: April 14, 1925. Completed: May 7, 1925. John G. White, Ashland, Ky., contractor. Production: Dry, plugged and abandoned.

Strata	Thickness	Depth
RECENT		
Soil—conductor 13' .....	22	22
PENNSYLVANIAN SYSTEM		
Shale, dark .....	84	106
Sandstone .....	24	130
Shale, dark .....	5	135
Sandstone .....	15	150
Shale .....	76	226
Limestone .....	10	236
Shale, dark (gas 240) .....	3	239
Sandstone .....	51	290
Shale, dark .....	10	300
Sandstone .....	5	305
Shale, dark .....	30	335
Coal .....	2	337
Shale, dark .....	59	395
Shale, dark .....	23	418
Shale, light .....	32	450
Shale, dark .....	20	470
Fire clay .....	5	475
Sandstone .....	10	485
Shale, sandy .....	10	495
Shale, dark .....	19	514
Shale, sandy .....	13	527
Sandstone (gas 532) .....	69	596
Limestone—"Big Lime" .....	18	614
Shale .....	1	615
Limestone—"Big Lime" .....	31	646
Limestone, sandy .....	9	655
Shale, dark .....	25	680
Sandstone—"Big Injun"—(water 745) .....	140	820
Shale, sandy .....	433	1253
Shale—"Sunbury" .....	18	1271
Sandstone—"Berea"—oil 1291', gas 1339' to 1353' .....	90	1361
Shale, dark .....	39	1400
DEVONIAN SYSTEM		
Shale, black .....	78	1478
Shale, light .....	27	1505

Strata	Thickness	Depth
<b>DEVONIAN SYSTEM</b>		
Shale, black .....	13	1518
Fire clay .....	12	1530
Shale, light .....	36	1565
Shale, brown .....	215	1780
Shale, gray .....	20	1800
Shale, brown .....	135	1935
Shale, light .....	143	2078
Limestone—"Corniferous" .....	18-4"	2096-4"
Total depth .....		2096-4"

**WELL No. 58.**

Lewis Skaggs, No. 1, lessor. Summit Oil & Gas Co., lessee. Location: On head waters of Daniels Fork, Boyd County, Ky. Commenced: 1925. Completed: April 10, 1925. Production: 50,000 cu. ft. of gas in Berea, Corniferous, dry. Driller: W. R. Forman. C. H. E. 709.0' A. T. Authority: S. D. Wheeler.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, shale and coal .....	518	518
<b>MISSISSIPPIAN AND DEVONIAN SYSTEMS</b>		
Limestone—"Big Lime" .....	52	570
Sandstone—"Big Injun" and Waverly shale	548	1118
Shale—"Sunbury" .....	15	1133
Sandstone—"Berea" and Devonian shale....	777	1910
Limestone (Corniferous sand) .....	140	2050
Total depth .....		2050

Notes:—Shot 2nd pay in Berea, and shot top pay, Friday, April 10th. Partial record only.

**WELL No. 63-A.**

The American Rolling Mill Company, Ashland, Ky., No. 15 (W-6), lessor and lessee. Location: Six miles from Ashland, Kentucky, east of the Midland Trail, and 1,000 feet northeast of Mason No. 33 well, in Boyd Co., Ky. Casing head elevation 695.20. Commenced: March 28, 1925. Completed: May 4, 1925. John G. White, Ashland, Ky., contractor. Production: Good gas well but was lost in setting casing on top of Big Lime. Plugged and abandoned.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil and gravel .....	13	13

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, light .....	7	20
Shale, sandy .....	20	40
Shale, dark .....	30	70
Shale, sandy .....	60	130
Shale, light (gas 135) .....	40	170
Sandstone, hard .....	30	200
Coal (water) .....	2	202
Shale, dark .....	18	220
Fire clay .....	5	225
Shale, dark .....	25	250
Shale, light .....	7	257
Shale, dark .....	8	265
Shale, light .....	35	300
Shale, sandy .....	30	330
Shale, light .....	40	370
Shale, sandy .....	20	390
Shale, light .....	20	410
Shale, dark .....	30	440
Sandstone—gas 445 .....	27	467
Shale, dark .....	5	472
Sandstone, white .....	39	511
Shale, dark—water 552' .....	39	550
Sandstone (three-fourths million) .....	92	642
Shale—gas 555' .....	12	654
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, "Big Lime" (inexhaustible water at 565) .....	31	684
Shale, light .....	24	708
Limestone—"Big Injun" .....	60	768
Total depth .....		768

**WELL LOG No. 63-B.**

The American Rolling Mill Company, Ashland, Ky., No. 15 (W-9), lessor and lessee. Location: Six miles southeast of Ashland, Ky., within 20 ft. of well 63-A. Casing head elevation 695.0' A. T. Commenced: May 4, 1925. Completed: 1925. John G. White, Ashland, Ky., contractor. Production: Natural gas; Corniferous plugged at 2102'.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil and gravel .....	13	13
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, light .....	2	15
Sandstone .....	10	25



AMERICAN ROLLING MILL CO., NO. 15

This well was drilled by J. G. White in April, 1925. It is located on Mason Branch near Summit Station.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, dark .....	18	43
Shale, light .....	11	54
Shale, dark .....	18	72
Coal .....	2	74
Shale, dark .....	6	80
Shale, light .....	25	105
Coal .....	1	106
Shale, light .....	9	115
Sandstone .....	45	160
Shale .....	23	183
Coal .....	1	184
Shale, light .....	6	190
Coal .....	2	192
Fire clay .....	22	214
Shale, dark .....	5	219
Shale, light .....	5	224
Shale, dark (10" casing 2271'-2") .....	36	260
Sandstone, light .....	35	295
Shale, dark .....	12	307
Shale, sandy .....	12	319
Shale, dark .....	11	330
Shale, light .....	35	365
Shale, sandy .....	45	410
Shale, dark (gas 417) .....	7	417
Coal .....	1	418
Shale, dark .....	22	440
Sandstone (gas 445, water 450) .....	27	467
Shale (water 472') .....	5	472

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone (little water 484') .....	40	512
Shale, dark .....	36	548
Sandstone (big water 552' and gas) .....	98	646
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—"Big Lime"—(8¼ casing 656') .....	33	679
Sandstone .....	14	693
Shale .....	13	706
Sandstone—"Big Injun"—(6⅝ casing 839') .....	133	839
Shale .....	441	1280
Shale—"Sunbury" .....	10	1290
Sandstone—"Berea"—(show oil 1304'-1311') .....	38	1328
Shale (gas 1325') .....	12	1340
Sandstone (gas 1354'-1370') .....	30	1370
Shale .....	52	1422
<b>DEVONIAN SYSTEM</b>		
Shale, black .....	83	1505
Shale, light .....	82	1587
Shale, dark .....	236	1823
Shale, light .....	15	1838
Shale, black .....	34	1872
Shale, light .....	36	1908
Shale, brown .....	62	1970
Shale, light (plugged, Cornif. 2102) .....	132-4"	2102-4"
Limestone—"Corniferous" (oil 2127-77) .....	102-8"	2205
Total depth .....		2205

**WELL LOG No. 64.**

Nando Felty, No. 1, lessor. The American Rolling Mill Company, Ashland, Ky., No. 16 (W-7), lessee. Location: Six miles from Ashland, Ky., on the Midland Trail, and one mile south of Summit Station in Boyd County, Ky. Casing head elevation 691.2' A. T. Commenced: April 6, 1925. Completed: 1925. John G. White, Ashland, Ky., contractor. Production: Small gas and oil, well plugged and abandoned.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil (conductor) .....	8	8
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, blue ("mud") .....	13	21
Sandstone .....	14	35
Shale, dark .....	35	70
Coal .....	3	73
Shale, dark .....	19	92
Sandstone .....	83	175

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, dark .....	87	262
Sandstone .....	13	275
Shale, light .....	5	280
Sandstone .....	20	300
Shale, dark .....	28	328
Coal .....	3	331
Shale, dark (gas 430-440) .....	99	430
Sandstone .....	50	480
Shale, light .....	28	508
Sandstone .....	3	511
Shale, dark .....	8	519
Sandstone .....	68	587
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	19	606
Limestone, sandy—"Big Lime" .....	32	638
Sandstone—"Big Injun"—gas 640' .....	12	650
Limestone .....	8	658
Shale, light .....	29	687
Limestone .....	8	695
Sandstone (water 761, 1 bbl. hr.).....	119	814
Shale, gray .....	236	1050
Limestone, black, shells .....	18	1068
Shale, gray .....	177	1245
Limestone, shells .....	6	1251
Shale—"Sunbury" .....	12	1263
Sandstone—"Berea"—(show oil 1263).....	15	1278
Shale .....	1	1279
Sandstone, brown .....	11	1290
Shale .....	19	1309
Sandstone—"Berea" .....	13	1322
Shale .....	6	1328
Sandstone—"Berea"—good show oil 1345....	38	1366
Shale, blue .....	44	1400
DEVONIAN SYSTEM		
Shale, black .....	125	1525
Shale, light .....	50	1575
Shale, brown .....	370	1945
Shale, light .....	129	2074
Limestone—"Corniferous" .....	89-2"	2163-2"
Total depth .....		2163-2"

## WELL No. 78.

American Rolling Mill Co., Ashland, Ky., No. 18 (W-10), lessor and lessee. Location: Four miles southwest of Ashland, Ky., Boyd County. Casing head elevation 693.21' A. T. Commenced: May 20,





## CABIN BRANCH GASSER

This well, when flush, produced large amounts of gas from the Salt Sand at shallow depths. Its productive record surpasses that of any other shallow gasser drilled in Boyd County.

1925. Completed: May 28, 1925. John G. White, Ashland, Ky., contractor. Production: Fine gas well when flush.

Strata	Thickness	Depth
RECENT		
Soil .....	9	9
PENNSYLVANIAN SYSTEM		
Shale .....	31	40
Coal .....	2	42
Shale, muddy .....	3	45
Shale, sandy (big water at 50') .....	40	85
Shale, muddy .....	53	143
Sandstone .....	25	168
Shale, muddy .....	7	175
Sandstone .....	17	192
Shale, muddy (10" casing 232') .....	40	232
Sandstone .....	16	248
Shale, dark (gas in shale 263') .....	22	270
Sandstone .....	35	305
Shale .....	40	345
Shale, black (gas in shale at 350') .....	35	380
Sandstone, gray .....	18	398
Shale, black .....	30	428
Shale .....	32	460
Sandstone, dark, "salt" .....	10	470
Shale, light (water, 6 bbls. per hr., 495)....	25	495
Sandstone (gas at 522-528') .....	33½	528½
Total depth .....		528½

Note:—Top gas sand 495', but no gas to 522'; tubed and closed into line.

## WELL LOG No. 79.

The American Rolling Mill Company, Ashland, Ky., No. 19 (W-11), lessor and lessee. Location: Two miles south of Ashland, Ky., on the Midland Trail, Boyd County, Ky. Casing head elevation 642.52' A. T. Commenced: June 1, 1925. Completed: July 4, 1925. John G. White, Ashland, Ky., contractor. Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil .....	16	16
PENNSYLVANIAN SYSTEM		
Shale (big water at 21') .....	8	24
Sandstone (gas at 50') .....	28	52
Shale, dark .....	48	100
Sandstone .....	30	130
Shale, light .....	10	140
Shale, muddy .....	50	190
Shale, sandy .....	10	200
Shale, dark .....	35	235
Sandstone .....	45	280
Shale, dark .....	60	340
Shale, gray .....	18	358
Shale, dark .....	42	400
Shale, sandy (water at 420') .....	65	465
Shale, dark (water 450') .....	8	473
Sandstone (No. 10 gas sand) .....	3	476
Shale, sandy .....	27½	503½
Sandstone (No. 10 gas sand) .....	3	506½
Sandstone (water 507 and gas) .....	23½	530
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	31	561
Shale, sandy .....	2	563
Limestone, gray .....	38	601
Sandstone—"Big Injun" .....	20	621
Shale .....	8	629
Sandstone (second "Big Injun") .....	39	768
Shale, dark (water 683) .....	442	1210
Shale—"Sunbury" .....	21	1231
Sandstone—"Berea"—(show oil 1241) .....	11	1242
Shale, muddy .....	42	1284
Sandstone—"Bedford"—(gas 1291) .....	29	1313
Shale, sandy .....	62	1375
DEVONIAN SYSTEM		
Shale, black .....	72	1447
Shale, light .....	98	1545
Shale, brown (gas 1749) .....	204	1749
Shale, white .....	2	1751

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, brown .....	20	1771
Shale, light .....	15	1786
Shale, brown (gas 1911') .....	140	1926
Shale, light .....	132	2058
Limestone—"Corniferous" .....	25	2083
Limestone—"Corniferous"—(gas 2142'-8") ..	84-8"	2167'-8"
Total depth (show oil 2155) .....		2167'-8"
Conductor 13", 16'. Casing 10" 213'; 8" 545'; 8" 768'.		

## WELL LOG No. 80.

American Rolling Mill Company, Ashland, Ky., No. 20 (W-12), lessor and lessee. Location: Three miles southwest of Ashland,  $\frac{1}{2}$  mile southeast of the Midland Trail, on head of Keys Creek, Boyd County, Ky. Casing head elevation 701 ft. A. T. Commenced: July 1, 1925. Completed: Aug. 8, 1925. John G. White, Ashland, Ky., contractor. Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil .....	12	12
PENNSYLVANIAN SYSTEM		
Sandstone .....	4	16
Shale, blue .....	24	40
Coal .....	2	42
Sandstone (water at 85) .....	43	85
Shale .....	5	90
Sandstone .....	30	120
Shale, sandy .....	7	120
Sandstone, gray .....	15	142
Shale .....	13	160
Shale, sandy (water at 175) .....	15	175
Sandstone .....	42	217
Sandstone, gray sandy .....	11	228
Shale, muddy .....	19	247
Shale, sandy .....	7	254
Shale, muddy (gas at 276) .....	22	276
Shale, sandy .....	15	291
Sandstone .....	37	328
Shale, dark .....	9	337
Sandstone, gray (gas at 338) .....	28	365
Shale .....	26	391
Shale, light .....	33	424
Shale, dark .....	50	474
Sandstone .....	10	484

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone (water) .....	6	490
Sandstone .....	28	518
Sandstone (water) .....	6	524
Sandstone .....	14	538
Shale, black .....	1	539
Sandstone .....	6	545
Shale (gas at 571) .....	25	570
Sandstone (water at 573) .....	71	641
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	21	662
Shale, limy .....	1	663
Limestone—"Big Lime" .....	41	704
Sandstone .....	4	708
Limestone, sandy .....	22	730
Shale, green .....	4	734
Sandstone—"Big Injun" .....	48	782
Pebbles .....	5	787
Sandstone—"Big Injun" .....	8	795
Shale .....	5	800
Shale, sandy .....	220	1020
Shale, dark .....	23	1043
Shale .....	44	1087
Shale, light gray .....	5	1302
Shale—"Sunbury" .....	20	1322
Sandstone—"Berea"—(gas at 1322).....	11	1333
Sandstone (broken shaly) .....	36	1369
Sandstone, brown—gas at 1369 .....	39	1408
Shale, sandy .....	14	1422
DEVONIAN SYSTEM		
Shale, light .....	21	1443
Shale, brown .....	97	1540
Shale, light .....	110	1650
Shale, brown (gas at 1850) .....	187	1837
Gas "sand"—"Gordon No. 1" .....	32	1869
Shale, light .....	18	1887
Gas "sand"—"Gordon No. 2" (gas at 1893)..	40	1927
Total depth .....		1927'-3"

## WELL LOG No. 81.

The American Rolling Mill Company, Ashland, Ky., No. 21 (W-13), lessor and lessee. Location: Four miles southwest of Ashland, Ky., on the head of Mason Branch and east of the Midland Trail, Boyd County, Ky. Casing head elevation 742.78' A. T. Commenced: June 18, 1925.

Completed: July 21, 1925. John G. White, contractor, Ashland, Ky.  
Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil and gravel .....	12	12
PENNSYLVANIAN SYSTEM		
Sandstone .....	6	18
Fire clay .....	82	100
Sandstone .....	8	108
Fire clay .....	14	122
Coal .....	1	123
Shale, dark .....	6	129
Shale, light .....	79	208
Sandstone (water) .....	34	242
Shale .....	6	248
Coal .....	1	249
Shale (water at 262) .....	79	328
Sandstone .....	29	357
Shale .....	13	370
Sandstone .....	14	384
Shale, light (gas 430) .....	46	430
Sandstone .....	10	440
Shale, sandy .....	19	459
Shale (little water at 485) .....	26	485
Shale, sandy .....	16	501
Limestone, shells .....	7	508
Sandstone .....	12	520
Shale .....	5	525
Sandstone .....	23	548
Shale .....	2	550
Sandstone (like No. 10 at 550') .....	5	555
Shale (water at 563') .....	12	567
Sandstone, dark, broken (gas and water at 597-2½") .....	30	597
Sandstone, white .....	67-1½"	664-4"
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	65-8"	730
Shale .....	30	760
Sandstone—"Big Injun"—(water at 815') .....	20	780
Shale .....	27	907
Sandstone .....	26	933
Shale, sandy .....	387	1320
Shale—"Sunbury" .....	19½	1339½
Sandstone—"Berea" .....	28	1367½
Shale, break .....	21½	1389
Sandstone—"Bedford" (gas 1390' in Berea) .....	47	1436

Strata	Thickness	Depth
<b>DEVONIAN SYSTEM</b>		
Shale, light (gas at 1406) .....	29	1465
Shale, brown .....	76	1541
Shale, light .....	112	1653
Shale, dark .....	213	1866
Shale, light .....	15	1881
Shale, brown .....	18½	1899½
Shale, black—"Gordon" .....	18	1917
Shale, brown .....	13	1930
Shale, light .....	15	1945
Shale, brown .....	80	2025
Shale, light (show oil, gas 2237') .....	126-8"	2151-8"
Limestone—"Corniferous" .....	108	2259-8"
Total depth .....		2259-8"

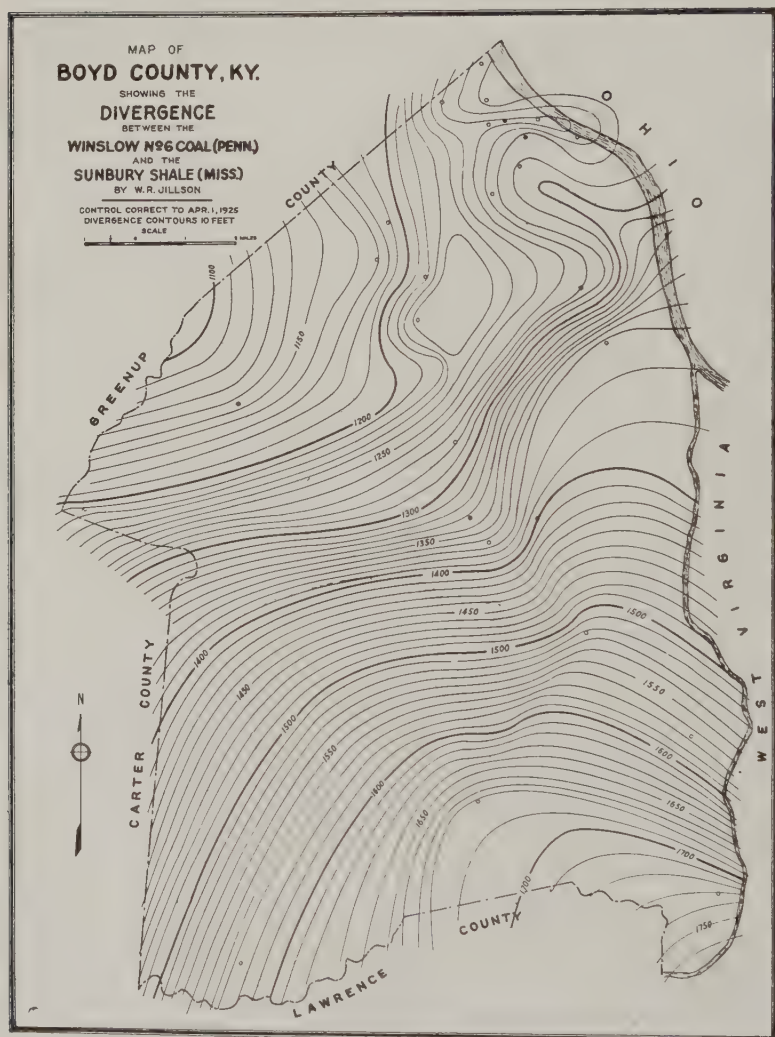
**WELL LOG No. 102.**

S. J. DeBord, No. 1, lessor. Summit Oil and Gas Co., lessee. Location: 500 ft. east of C. & O. Ry., between Summit Station and brick yard, Boyd County, Ky. Completed to Corniferous June 24, shot to Corniferous with 100 quarts June 25, 1925. W. R. Forman, contractor. Production: About 2 bbls. natural in Corniferous and 50,000 cu. ft. gas in "Berea." C. H. E. approximately 702. A. T.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, shale and coal .....	464	464
Sandstone, "salt sand" .....	116	580
Shale .....	5	585
Limestone—"Big Lime" .....	45	630
Shale .....	25	655
Sandstone—"Big Injun" .....	135	790
Shale—"Waverly" .....	418	1208
Shale—"Sunbury" .....	17	1225
Sandstone—"Berea" .....	109	1334
Shale, red .....	15	1349
<b>DEVONIAN SYSTEM</b>		
Shale, white .....	16	1365
Shale, brown .....	85	1450
Shale, white—Ohio shale .....	85	1535
Shale, brown .....	363	1898
Shale, white .....	133½	2031½
Limestone—"Corniferous" .....	95½	2127
Total depth .....		2127

Note:—Oil show 1241-1251; gas and oil show 1280-1287; oil 2111-2127; set 6½ casing at 790 ft.





Thickening of Carboniferous Sediments in Boyd County.

## WELL No. 111.

The American Rolling Mill Company, Ashland, Ky., No. 22 (W-14), lessor and lessee. Location: Three miles west of Ashland in 2nd horseshoe bend of Midland Trail, Boyd County, Ky. Casing head elevation 710.0 A. T. Commenced: July 24, 1925. Completed: Aug. 28, 1925. John G. White, contractor, Ashland, Ky. Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil .....	8	8
PENNSYLVANIAN SYSTEM		
Shale, light .....	47	55
Sandstone .....	12	97
Sandstone, gray .....	19	116
Shale, light .....	26	142
Coal (water) .....	1	143
Shale, dark .....	23	166
Sandstone (water) .....	40	206
Shale, light .....	8	214
Coal .....	1	215
Shale, dark .....	20	235
Shale, light .....	13	248
Sandstone .....	11	259
Shale, dark .....	18	277
Shale, sandy .....	14	291
Sandstone .....	38	329
Shale, muddy .....	1	330
Sandstone, gray .....	28	358
Shale, dark .....	12	370
Shale, light .....	23	393
Shale, dark .....	55	448
Shale, light .....	27	475
Sandstone, dark blue .....	11	486
Sandstone, dark gray .....	17	503
Shale, light .....	3	506
Sandstone, gray (No. 10 sand 510-511).....	5-1"	511-1"
Shale, black .....	39	550
Sandstone (water at 550) .....	80	630
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime" .....	58	688
Sandstone "Big Injun" (water at 700).....	12	700
Shale, dark .....	16	716
Sandstone "Big Injun" .....	126	842
Shale, light .....	444	1286
Shale, black, coffee—"Sunbury" .....	18	1304
Sandstone—"Berea" (gas 1308, oil 1315).....	14	1318

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sandstone, broken—"Berea" .....	34	1352
Sandstone—"Berea" (gas Berea 1361) .....	48	1400
DEVONIAN SYSTEM		
Shale, light .....	43	1443
Shale, black, coffee .....	78	1521
Shale, light .....	84	1605
Shale, brown .....	233	1838
Shale, light .....	12	1850
Shale, brown .....	12	1862
Shale, black (Gordon No. 1) (gas 1877, Gordon No. 1) .....	23	1885
Shale, black broken (gas 1926, Gordon No. 2) .....	35	1920
Shale, black .....	60	1980
Shale, light .....	136½	2116½
Limestone—"Corniferous" (oil, gas show 2132-2189) .....	92½	2209
Total depth .....		2209

## WELL LOG No. 112.

## CARTER COUNTY

J. W. Johnson, No. 1, lessor. John G. White, No. 1, lessee. Location: 6½ miles east of Grayson, on head of Wilson Creek, near Upper Wilson School, Carter County, Ky., on Midland Trail. Commenced: Sept. 5, 1925. Completed: Oct. 3, 1925. Production: Small gas; plugged and abandoned after shooting 781-1787 and 1798-1804 with 40 quarts. C. H. E. 671.0' A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	11	11
PENNSYLVANIAN SYSTEM		
Sandstone .....	2	13
Fire clay .....	13	26
Sandstone (water at 32) .....	6	32
Shale, light .....	4	36
Sandstone (water at 45) .....	9	45
Shale, light .....	12	57
Fire clay .....	3	60
Coal .....	1	61
Fire clay .....	5	66
Shale .....	16	82
Sandstone (10" casing, 117 water) .....	33	115
Shale, dark .....	13	128
Sandstone, gray (gas 133) .....	7	135

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, muddy .....	30	165
Shale, light .....	10	175
Sandstone (oil 180) .....	6	181
Shale, light .....	14	195
Shale, dark .....	12	207
Sandstone, gray (gas 208) .....	13	220
Shale, dark (salt water 290) .....	31	251
Sandstone—"salt" (gas 263-268) .....	199	450
<b>MISSISSIPPIAN SYSTEM</b>		
Sandstone—"Big Injun" (462'-8½ gas).....	45	495
Shale, sandy .....	73	568
Sandstone—"Big Injun" (oil 574) .....	70	638
Sandstone (oil 643, water 663) .....	57	795
Shale, sandy, dark .....	35	830
Shale, light .....	115	945
Shale, dark .....	94	1039
Shale—"Sunbury" .....	7	1046
Sandstone—"Berea" (oil 1115) .....	89	1135
Shale, dark (shot 60 quarts) .....	11	1146
Sandstone, dark (1115-24) .....	15	1160
<b>DEVONIAN SYSTEM</b>		
Shale, light .....	26	1186
Shale, brown .....	74	1260
Shale, light (Gordon No. 1) .....	62	1322
Shale, black (Gordon No. 1) (gas 1322)....	280	1502
Shale, light (shot 60 qts. 1325-1334).....	23	1525
Shale, brown .....	48	1573
Shale, light .....	18	1591
Shale, black (Gordon No. 2).....	54	1645
Shale, light (gas 1591) .....	104	1749
Limestone—"Corniferous" (gas 1783, oil 1798) .....	75	1824
Total depth .....		1824

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Manuscript written May, 1925.

Revised July, 1926.

## VI.

### MORTON'S GAP OIL POOL.

In September, 1922, announcement was made of the discovery of oil in commercial quantity in a well on the C. S. Williams farm in Southeastern Hopkins County. The strike was made by the Copper Flash Oil Co. of Linton, Indiana, while drilling a wild-cat test. The success which attended this isolated prospect drilling in a region that had generally been regarded as somewhat unfavorable because of a rather considerable amount of faulting has stimulated much inquiry as to the oil and gas possibilities of this and adjacent regions. Subsequent successful drilling has drawn additional attention to this productive district. Geological conditions present in this field have many parallels in the Western Kentucky coal field thereby rendering a description of this region as general as well as specific value to oil and gas operators.

The Morton's Gap Oil Pool, as this producing district has now become generally known, is located in the Western Kentucky coal field in Southeastern Hopkins County, 115 miles in an air line Southwest of Louisville. The pool is about  $2\frac{1}{2}$  miles southeast of Morton's Gap on the road to White Plains. It is also about two miles northeast of Nortonsville and about one and one-half miles east of the "Dixie Bee Highway" from Henderson to Hopkinsville, Kentucky. Madisonville, which is the county seat, is  $8\frac{1}{2}$  miles an air line northwest of this field. The nearest postoffice is Oak Hill, a small mining community one mile due west of the principal producing area. The field is conveniently served by the Illinois Central Railroad and the L. & N. Railroad. These lines intersect at Nortonsville.

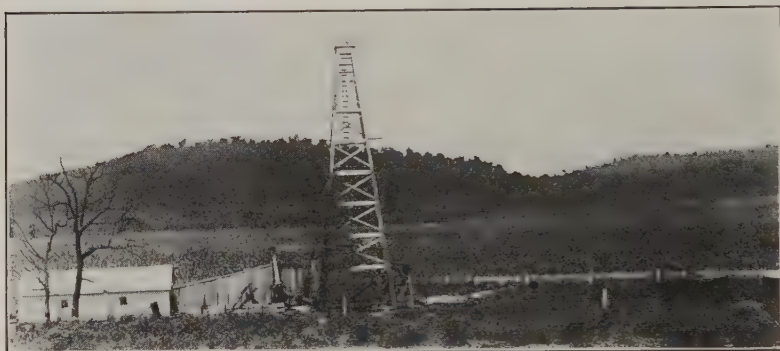
#### DRAINAGE AND TOPOGRAPHY.

Embraced well within the Western Coal Field, the region surrounding the Morton's Gap Oil Pool is one of the low rounded hills widely separated by broad flat alluvium filled valleys. The productive area centering about the C. S. Williams lease is situated near to the divide between the Green and Tradewater



Rivers on the head of a branch of Drakes Creek, a tributary of Pond River, which is only four miles distant to the East.

The general relief of this district is slight, being not more at a maximum generally than 100 feet. The flat bottoms of



OIL WELL ON D. WILLIAMS FARM

This well is  $2\frac{1}{2}$  miles from Morton's Gap and is 2,057 feet deep. It has been pumping about 8-10 bbls a day.

Drakes Creek range from  $\frac{1}{2}$  mile to 2 miles in width and 400 feet above sea level, while a very small part of the knoll east of Oak Hill catches the 500 foot contour. The maximum relief to the northwest in the vicinity of Madisonville on the head of Flat Creek increases slightly and is about 125 feet. To the south and southeast in the vicinity of Nortonville and White Plains the general relief decreases to 50 or 60 feet. The hills throughout this district are low and rounded, exhibiting a decided tendency to flare broadly out into the flat alluvium filled creek bottoms. The uplands exhibit as might be expected a fairly thick clay loam which rather effectually conceals outcrops of the bedded rocks.

#### DEVELOPMENT.

The first well in the Morton's Gap pool, as has already been indicated, was drilled on the C. S. Williams lease by the Copper Flash Oil Co., of Linton, Indiana, in September, 1922, to a depth of 2,132 feet. Oil was secured at a depth of 2,057 feet, and the well was shot from 2,050-60 feet. This well pumped three to four barrels natural before shooting, and about seven to ten barrels afterwards. A reported Baume of 37.9 degrees has been

given for this oil, and a considerable amount of gas was produced from the well.

Since the drilling in of this first well, five additional wells have been drilled; three on the C. S. Williams farm and two on



View Looking East on the Holeman Tract.

the Ashley Holloman lease which is located on the opposite side of the road from the Williams farm. No. 2 Williams well was drilled to a depth of 500 feet, and is an excellent producer. No. 3 Williams well was drilled to a depth of 701 feet, and plugged to 500 feet when it was shot and made into a good producing well. No. 4 Williams well was drilled to a depth of 577 feet and was a dry hole. Ashley Holloman No. 1 well was drilled to a depth of 511 feet and was a good well, as was the Holloman No. 2 which was drilled to a depth of 439 feet. Detailed logs of these wells and some others are made a part of this report.

All of the above wells are within a radius of  $\frac{1}{4}$  mile of the P. Morton lease on which one well has been drilled to a depth of 500 feet. At the time the field work was done on this report the tools were in this hole, and it was reported to be dry.

Two wells have been drilled  $\frac{3}{4}$  of a mile west of Oak Hill and two miles west of Morton's Gap oil pool. Both of these wells were dry. The southernmost of these wells was located on the Clement School fault, and probably never had any chance of production. A location has been found for a well at Oak Hill.

Three other wells have been drilled in the vicinity of Morton's Gap oil pool, all of which are dry. Two of these wells were drilled south of the Nortonville fault in the vicinity of White Plains. One of the wells on the lease of T. E. Dillingham was drilled by W. W. Kingston of Morton's Gap, Kentucky. The last of the three was drilled about  $\frac{1}{2}$  mile north of Oak Hill fault in the bottom of Drakes Creek.



#### GENERAL GEOLOGY.

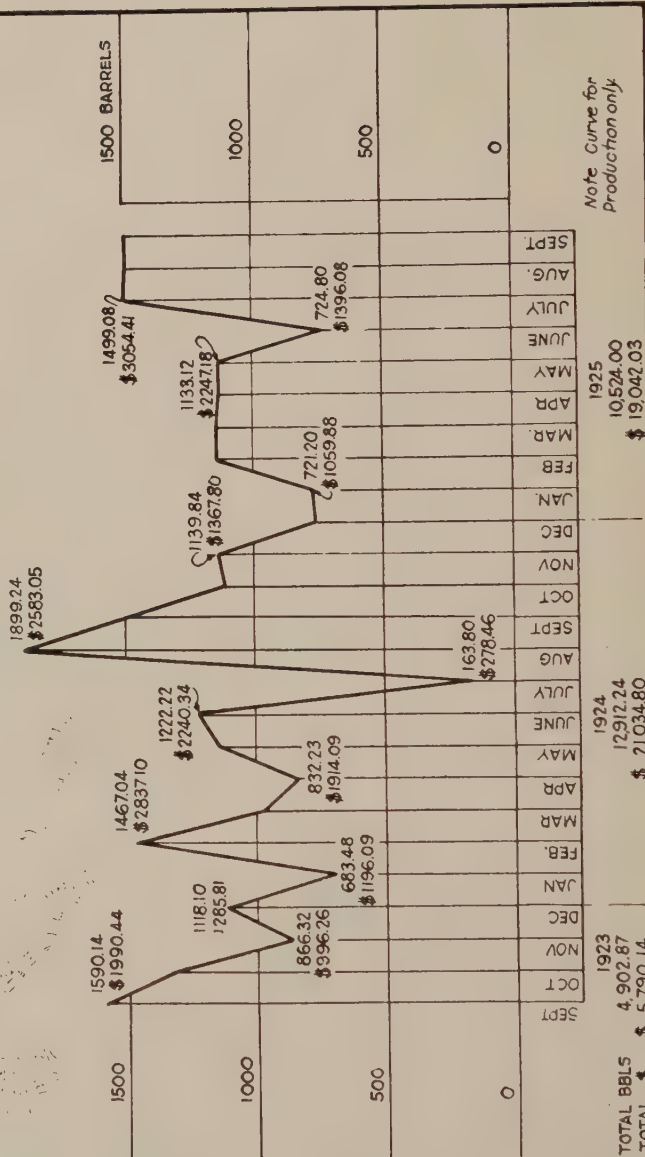
All of the rocks exposed in the vicinity of the Morton's Gap Pool are of Coal Measure age (Allegheny-Pennsylvanian). They consist of shales, sandstones, coals and limestones—named in the order of their importance in the section. The highest hills north and west of the pool show sediments deposited above the No. 11 coal while the lowest are those close below No. 9 coal.

No. 11 coal varies from 5½ to 7 feet in this part of Hopkins County, while No. 9 below it is thinner, generally about five feet in thickness.

Due to the silting up of this district and the deep weathering of the rocks, pronounced structural features, other than the occasional outcrop of one of the normal faults, are not noticeable in the field. An example of evident faulting is to be seen where the Oak Hill fault strikes N 80° E. across the Madisonville pike about ½ mile south of the pool. It is thought that the petroleum accumulation in the Morton's Gap pool is probably local and is closely related to the sharply plunging Oak Hill fault. South of this fault there is a well defined rectangular graben as the accompanying geological sketch map indicates. Unrevealed subsurface anticlinal conditions probably control the oil body which may in part at least have been derived through subsurface fissures and fractures developed in the course of the faulting. A review of the logs of the shallow wells indicate that the producing sand is probably the "Finnie sandstone" (Tradewater formation-Pottsville age). Casing head elevations in the vicinity of Morton's Gap oil pool are quite a little below No. 9 coal and just below the strong Sebree sandstone.

Pipe Line Runs from the Morton's Gap pool began with 1,500 barrels valued at \$1,990.00 in September, 1923. Production from this field dropped off gradually through the Fall to 683 barrels in January, 1924. By August of 1924, however, new and successful drilling brought the volume of the pool back to its original production. The pool reached its peak, 1,899 barrels, in mid-summer. During the Fall of 1925 the wells in the Morton's Gap pool were running along evenly at about 1,500 barrels per month giving indication of having settled to a rather steady production. The shallow commercial production of this pool is entirely from Pennsylvanian (Coal Measure) sands. The small oil production secured from the C. S. Williams No. 1 at a depth of 2,057-59 feet was from a limestone, possibly of Chester (Mississippian) age. Oil runs from the Morton's Gap pool follow.

KENTUCKY GEOLOGICAL SURVEY  
 SERIES VII, 1925  
**PRODUCTION AND VALUE OF CRUDE OIL  
 IN HOPKINS CO., KY.  
 BY W. R. JILLSON**





## OIL RUNS—MORTONS GAP POOL

## Central Producing &amp; Refining Co.

1923	Bbls.	Value.
Sept. ....	1,590.14	\$1,990.44
Oct. ....	1,328.31	1,517.63
Nov. ....	866.32	996.26
Dec. ....	1,118.10	1,285.81
Total .....	4,902.87	\$5,790.14

## Central Producing &amp; Refining Co.

1924

	Bbls.	Value.
Jan. ....	683.48	\$1,196.09
Feb. ....	1,467.04	2,837.10
Mar. ....	974.92	2,118.09
Apr. ....	832.23	1,914.09
May ....	1,147.05	2,476.40
June ....	1,222.22	2,240.34
July ....	163.80	278.46

## Copper Flash Oil Co.

1924

	Bbls.	Value.
Aug. ....	1,899.24	\$2,583.05
Sept. ....	1,507.86	1,848.00
Oct. ....	1,118.72	1,268.38
Nov. ....	1,139.84	1,367.80
Dec. ....	755.84	907.00
Total .....	12,912.24	\$21,034.80

## Copper Flash Oil Co.

1925

	Bbls.	Value.
Jan. ....	771.20	\$1,059.88
Feb. ....	1,139.36	2,164.28
Mar. ....	1,143.36	2,229.55
Apr. ....	1,129.76	2,203.03
May ....	1,133.12	2,247.18
June ....	724.80	1,396.08
July ....	1,499.08	3,054.41
Aug. ....	1,492.32	2,003.62
Sept. ....	1,491.00	2,684.00
Total .....	10,524.00	\$19,042.03



## WELL LOG No. 1.

## HOPKINS COUNTY

C. S. Williams, No. 1, lessor. Copper Flash Oil Co., Linton, Ohio, lessee. Location: Near Morton's Gap, Hopkins County, Ky. Commenced: Dec. 12, 1921. Completed: Oct. 1922. Production: Petroleum. J. M. Huggins, Driller. Authority: E. A. Powell, supt., July 17, 1923.

Strata	Thickness	Depth
RECENT		
Clay .....	12	12
PENNSYLVANIAN SYSTEM		
Limestone, (above No. 7 coal) .....	6	18
Shale, sandy .....	12	30
Shale, brown .....	50	80
Shale, black .....	14	94
Shale, black .....	16	110
Coal (No. 6?) .....	3	113
Shale, brown .....	32	145
Shale, dark .....	20	165
Shale, black .....	15	180
Coal .....	3	183
Shale, white .....	17	200
Shale, white, hard .....	20	220
Shale, black, hard .....	30	250
Limestone, blue .....	4	254
Coal .....	6	260
Shale, white .....	50	310
Sandstone, coarse white .....	25	335
Shale, gray sandy .....	45	380
Shale, blue .....	15	395
Sandstone, coarse white .....	55	450
Shale, brown .....	50	500
Shale, light .....	10	510
Limestone, hard .....	5	515
Sandstone .....	85	600
Shale, sandy .....	50	650
Sandstone .....	35	685
Shale, black .....	15	700
Sandstone, white .....	12	712
Sandstone, black, shaly, limey .....	23	735
Sandstone, hard .....	15	750
Sandstone, white, hard .....	130	880
Shale, black .....	15	895
Shale, black, sandy .....	23	918
Shale, black .....	17	935
Sandstone, white (Artesian) .....	15	950
Shale, black, hard .....	42	992

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black "Pencil Cave" .....	44	1036
Sandstone and shale, brown, hard.....	50	1086
Shale, white .....	5	1091
Shale, dark, hard .....	17	1108
Shale, black .....	6	1114
MISSISSIPPIAN SYSTEM		
Limestone, dark gray .....	6	1120
Limestone, black .....	6	1126
Limestone, white .....	9	1135
Shale, black, hard .....	8	1143
Shale, black, hard .....	11	1154
Limestone, gray .....	6	1160
Shale, soft .....	10	1170
Limestone, black .....	12	1182
Shale, black .....	18	1200
Limestone, hard .....	8	1208
Shale, dark .....	2	1210
Shale, soft black .....	22	1232
Limestone, black .....	12	1244
Shale, dark, hard .....	4	1248
Limestone, hard .....	16	1264
Shale, green .....	12	1276
Limestone, hard .....	17	1293
Sandstone, gray .....	10	1303
Limestone, hard .....	19	1322
Shale, black .....	4	1326
Limestone .....	4	1330
Shale, soft .....	9	1339
Limestone .....	6	1345
Limestone, shaly .....	5	1350
Limestone, shaly, hard .....	5	1355
Shale, soft .....	40	1395
Limestone, light .....	6	1401
Limestone, hard brown .....	17	1418
Shale, black .....	3	1421
Shale, blue .....	8	1429
Shale, hard .....	26	1455
Sandstone, coarse .....	10	1465
Sandstone "Salt Water," flowing water.....	26	1491
Sandstone, hard .....	4	1495
Sandstone .....	20	1515
Shale, black, hard .....	25	1540
Limestone, hard .....	24	1564
Shale, blue .....	7	1571

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, "Red Rock" .....	5	1576
Shale, blue sandy .....	52	1628
Limestone, gray .....	3	1631
Shale, hard, blue .....	5	1636
Limestone .....	8	1644
Shale, blue, sandy .....	43	1687
Limestone, hard .....	11	1698
Shale, brown .....	5	1703
Shale, dark green .....	5	1708
Sandstone, green .....	18	1726
Shale, green .....	20	1746
Limestone, shaly .....	14	1760
Shale, black, hard .....	5	1765
Shale, black .....	7	1772
Limestone .....	3	1775
Shale, blue .....	13	1788
Limestone, dark .....	8	1796
Shale, dark blue .....	8	1804
Limestone, hard black .....	2	1806
Shale, soft dark .....	9	1815
Limestone, brown .....	8	1823
Shale, black .....	5	1828
Limestone, brown .....	6	1834
Shale, hard black .....	4	1838
Limestone, brown sandy .....	34	1872
Shale, dark blue .....	18	1890
Limestone, hard .....	20	1910
Limestone, hard black-oil show .....	8	1918
Shale, black .....	21	1939
Sandstone "Salt Water," 4 bailers, hr. ....	16	1955
Limestone, hard .....	33	1988
Limestone, hard .....	5	1993
Limestone, hard black .....	10	2003
Limestone, hard .....	26	2029
Shale, red and blue .....	3	2032
Limestone, hard .....	25	2057
Limestone, hard (oil 8 bbls., 2057-9) .....	35	2092
Limestone, white .....	40	2132
Total depth .....		2132

Note:—There was over 1100 feet of under reaming done in this hole. All shales caved. Oil production at 2057 feet came from 15 in. of producing limestone "sand." Production at 2057 feet, 8 bbls. Cut-

tings, 1993-2003 feet, showed 2 ft. of red and blue shale; 1988-1993 ft. 2 ft. red and blue shale.

8¼" casing set 260-310 ft. Hole full of artesian water 750-880 ft.

6¼" casing set 1687-1698 ft. 4⅞" casing set 2029-2032 ft.

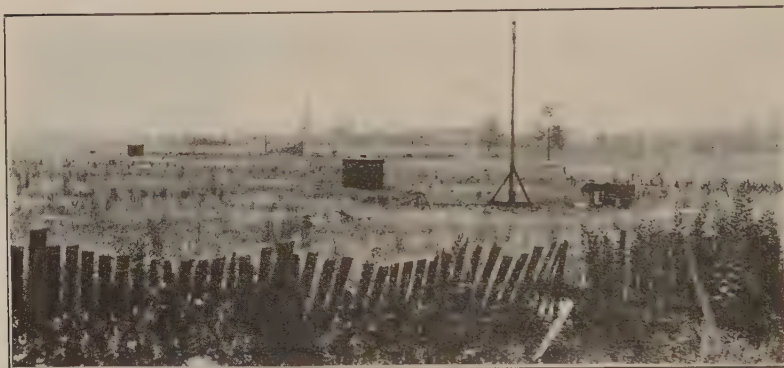
#### WELL LOG No. 2.

C. S. Williams, No. 2, Lessor. Copper Flash Oil Co., Lessee. Location: Near Morton's Gap, Hopkins County, Ky. Commenced: Feb. 15, 1923. Completed: Mar. 2, 1923. Production: Flush 225 bbls. J. M. Huggins, Driller. Authority: E. A. Powell, Supt.

Strata	Thickness	Depth
RECENT		
Soil .....	12	12
PENNSYLVANIAN SYSTEM		
Limestone .....	6	18
Shale, blue .....	9	27
Limestone .....	13	40
Sandstone .....	25	65
Shale, brown .....	7	72
Shale, gray .....	14	86
Shale, dark .....	14	100
Limestone .....	5	105
Sandstone, gray .....	20	125
Sandstone .....	15	140
Shale, sandy .....	10	150
Shale, brown .....	5	155
Shale, black .....	5	160
Shale, gray .....	20	180
Shale, gray .....	20	200
Shale, gray sandy .....	15	215
Sandstone, white .....	10	225
Shale, gray .....	10	235
Shale, brown .....	10	245
Limestone, hard .....	5	250
Sandstone .....	8	258
Shale, and coal .....	6	264
Shale, gray .....	20	284
Shale, brown .....	30	314
Sandstone, brown .....	25	339
Sandstone, shaly .....	25	364
Sandstone, sharp .....	10	374
Shale, black .....	20	394
Sandstone, shaly .....	20	414
Sandstone, gray .....	10	424
Sandstone, gray .....	20	444
Shale, brown .....	11	455

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black .....	10	465
Sandstone (oil) .....	30	495
Sandstone, dark .....	5	500
Total depth .....		500'

Note:—This well is entirely in the Coal Measures.



#### THE HOLEMAN LEASE.

This property has three good wells and one dry hole at the present time. The wells are about 515 feet deep. View looking southwest.

#### WELL LOG No. 3.

C. S. Williams No. 3, Lessor. Copper Flash Oil Co., Lessee. Location: Near Morton's Gap, Hopkins County, Ky. Drilled: April, 1923. Production: Flush 24 bbls. Driller: J. M. Huggins. Authority: E. A. Powell, Supt.

Strata	Thickness	Depth
RECENT		
Soil .....	14	14
PENNSYLVANIAN SYSTEM		
Limestone .....	6	20
Shale, brown .....	20	40
Sandstone .....	40	80
Limestone .....	4	84
Coal .....	2	86
Shale, white, limy .....	34	120
Shale, sandy .....	20	140
Shale, hard .....	5	145
Shale, brown .....	55	200
Sandstone, white, sandy .....	40	240
Shale and crop of coal .....	5	245
Sandstone, white, shaly .....	55	300
Shale, white .....	50	350
Shale, white, limy .....	50	400

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black .....	39	439
Shale, hard .....	12	451
Shale .....	10	461
Shale, hard .....	12	473
Sandstone (oil) .....	12	485
Shale, hard .....	10	495
Shale, limy .....	11	506
Shale, dark, hard .....	70	576
Shale, sandy .....	58	634
Shale, light .....	56	690
Shale, brown .....	11	701
Total depth .....		701'

Note:—This well was completed in the Coal Measures and was shot at 485 feet after plugging back to 500 feet.

#### WELL LOG No. 4.

C. S. Williams No. 4, Lessor. Copper Flash Oil Co., Lessee.  
 Location: near Morton's Gap, Hopkins County, Ky. Commenced: —  
 —. Completed: May 18, 1923. J. M. Huggins, Driller. Production:  
 Dry.

Strata	Thickness	Depth
RECENT		
Soil .....	11	11
PENNSYLVANIAN SYSTEM		
Clay, yellow .....	10	21
Shale, blue .....	7	28
Sandstone .....	14	42
Shale, hard .....	8	50
Shale, round .....	28	78
Shale, light .....	8	86
Shale, gray .....	9	95
Limestone .....	5	100
Coal .....	2	102
Shale, gray .....	15	117
Limestone .....	3	120
Shale, brown .....	30	150
Shale, black .....	9	159
Coal .....	3	162
Shale, brown .....	20	182
Shale, hard .....	6	188
Sandstone, gray, sandy (gas) .....	27	215
Sandstone, gray, sandy .....	10	225
Shale, black .....	17	242



Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Coal .....	3	245
Shale, limy .....	5	250
Shale, brown .....	20	270
Shale, limy .....	20	290
Sandstone, white .....	30	320
Shale, dark .....	20	340
Shale, light .....	23	363
Shale, shelly .....	3	366
Shale, light, hard .....	12	378
Shale, shelly .....	5	383
Shale, hard .....	14	397
Sandstone, gray .....	17	414
Shale, gray .....	14	428
Limestone .....	2	430
Shale, gray .....	21	451
Shale, dark .....	6	457
Shale, gray .....	6	463
Shale, gray .....	6	469
Shale, black .....	19	488
Shale, sandy .....	12	500
Shale, black .....	6	506
Shale, sandy .....	6	512
Shale, light sandy .....	8	520
Shale, dark .....	5	525
Shale, black .....	11	536
Sandstone .....	41	577
Total depth .....		577'

Note:—At 544 salt water was encountered with black paraffin oil showing. This well was completed in the Coal Measures.

#### WELL LOG No. 5.

Drake No. 1, Lessor. Copper Flash Oil Co., Lessee. Location: Near Morton's Gap, Hopkins County, Ky. Commenced: July 10, 1923 Completed: —, —. Randolph and Stevenson, Drillers. Authority: E. A. Powell, Supt.

Strata	Thickness	Depth
RECENT		
Clay .....	22	22
PENNSYLVANIAN SYSTEM		
Shale, black .....	8	30
Shale, blue .....	10	40
Shale, gray, sandy .....	10	50
Shale, blue .....	15	65

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, light .....	25	90
Shale, black .....	5	95
Shale, light .....	43	138
Sandstone, gray .....	12	150
Shale, soft blue .....	15	165
Shale, sandy .....	14	179
Shale, light soft .....	21	200
Shale, brown .....	35	235
Shale, gray .....	7	242
Limestone and sandstone—oil show .....	10	252
Shale, white .....	9	261
Sandstone, brown .....	2	263
Shale, blue .....	23	286
Shale, white sandy .....	14	300
Sandstone, light brown .....	17	317
Shale, brown .....	11	328
Shale, blue .....	2	330
Limestone, black .....	7	337
Shale, white .....	16	353
Shale, white, limy .....	22	375
Shale, blue limy .....	17	392
Shale, black .....	6	398
Shale, blue sandy .....	33	421
Shale, blue .....	18	439
Total depth .....		439'

## WELL LOG No. 6.

Ashley Holloman No. 1, Lessor. Copper Flash Oil Co., Lessee.  
 Location: Near Morton's Gap, Hopkins County, Ky. Commenced: May  
 24, 1923. Production: Flush 50 barrels. T. L. Stricklein, Driller.  
 Authority: E. A. Powell, Supt.

Strata	Thickness	Depth
RECENT		
Clay .....	17	17
PENNSYLVANIAN SYSTEM		
Limestone, hard blue .....	11	28
Shale, blue .....	7	35
Limestone, white .....	107	142
Shale, blue and white .....	26	168
Sandstone, white .....	9	177
Shale, soft blue .....	40	217
Shale, white and fire clay .....	16	233
Shale, soft blue .....	35	268



TANKS ON WILLIAMS FARM.

No. 1 pump is used for pumping three wells. J. M. Huggins of Sullivan is the driller.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, white and fire clay .....	15	283
Shale, soft blue .....	40	323
Shale, white .....	16	339
Shale, dark .....	40	379
Shale, white .....	15	394
Shale, dark .....	32	426
Limestone, shaly, sandy .....	13	439
Shale, dark, sandy, limy .....	32	471
Shale, brown .....	9	480
Shale, hard black .....	11	491
Sandstone "oil sand" .....	20	511
Total depth .....		511'

## WELL LOG No. 7.

## Earlington Well.\*

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone .....	192	192
Shale .....	17	209
Shale and sandstone .....	9	218
Coal .....	1	219
Shale .....	45	264
Shale, dark, thin coal .....	5	269
Shale .....	23	292
Sandstone, with shale .....	27	319
Shale, sandy, hard (Cap) .....	1	320
Sandstone, white—water .....	47	367

\*Revised from Oil and Gas Resources of Ky. map. 343-44 Ky. Geol. S. 1920.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, black .....	2	369
Shale, and coal .....	2	371
Sandstone .....	32	403
Shale .....	2	405
Sandstone—oil show at 418 .....	77	482
Shale .....	21	503
Sandstone .....	25	528
Shale .....	80	608
Sandstone .....	35	643
Shale .....	9	652
Shale, sandy .....	19	671
Sandstone .....	130	801
Shale, pebbly .....	12	813
Sandstone .....	6	819
Limestone, blue .....	12	831
Shale .....	13	844
Sandstone .....	78	922
Shale .....	15	937
Sandstone .....	5	942
Coal .....	3	945
Sandstone .....	105	1050
Shale .....	1	1051
Sandstone .....	46	1097
Shale .....	2	1099
Sandstone, shale breaks .....	23	1122
Sandstone .....	12	1134
MISSISSIPPIAN SYSTEM		
Shale .....	4	1138
Limestone .....	12	1150
Shale, red .....	20	1170
Sandstone .....	5	1175
Shale .....	15	1190
Sandstone .....	14	1204
Shale, blue .....	10	1214
Sandstone .....	11	1225
Shale, limy .....	32	1257
Sandstone .....	6	1263
Shale, black .....	9	1272
Shale, soft .....	44	1316
Total depth .....		1316'

## WELL LOG No. 8.

G. L. & G. W. Clayton, lessors. The Shake-Rag Oil & Gas Co., Inc., lessees. Location: 1 mile N. E. of Friday's School, and N. W. of Madisonville, Ky., Hopkins County. Completed: Nov. 13, 1923. Elevation: about 500 ft. above sea level. Drilled by Harry Cowling. Authority: C. A. Ashby.

Strata	Thickness	Depth
RECENT		
Soil .....	6	6
PENNSYLVANIAN SYSTEM		
Sandstone .....	4	10
Shale, dark .....	10	20
Shale, dark, and sandstone .....	22	42
Coal (bone) .....	5	47
Shale .....	17	64
Sandstone (water) .....	4	68
Shale, black .....	27	95
Shale .....	7	102
Coal .....	8	110
Fire clay .....	25	135
Sandstone and limestone .....	20	155
Shale, black .....	95	250
Shale, white (soft) .....	25	275
Sandstone, hard .....	15	290
Shale, black .....	31	321
Coal .....	7	328
Sandstone, hard, white .....	10	338
Fire clay and shale .....	55	393
Coal .....	6	399
Fire clay .....	11	410
Limestone, gray and black .....	7	417
Sandstone, hard .....	3	420
Limestone, black .....	80	500
Shale .....	5	505
Coal .....	3	508
Fire clay .....	6	514
Limestone, soft .....	6	520
Shale .....	10	530
Shale, light .....	10	540
Shale, black .....	10	550
Limestone, hard .....	8	558
Fire clay .....	14	572
Limestone, hard black .....	20	592
Limestone and shale .....	8	600
Sandstone, hard .....	20	620
Shale, gray, dark .....	9	629

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale and muck .....	4	633
Coal and shale, dark .....	4	637
Shale, dark .....	29	666
Shale, and muck .....	9	675
Coal, light show .....	10	685
Shale and muck .....	35	720
Sandstone, hard .....	15	735
Coal .....	3	738
Fire clay .....	2	740
Fire clay and shale .....	6	764
Limestone .....	8	754
Limestone (hard cap over coal) .....	3	757
Coal .....	6	763
Sandstone .....	2	765
Limestone .....	3	768
Sandstone, hard .....	15	783
Sandstone (water) .....	5	788
Limestone and sandstone .....	4	792
Limestone .....	4	796
Limestone and sandstone .....	4	800
Sandstone, hard .....	18	818
Shale, sandy .....	12	830
Shale, black .....	10	840
Shale and coal .....	5	845
Coal .....	5	850
Limestone, gray .....	5	855
Limestone and sandstone mixed .....	5	860
Limestone, sandy .....	5	865
Sandstone, gray .....	5	870
Shale and sandstone .....	10	880
Shale, black .....	15	895
Coal .....	5	900
Shale, green .....	5	905
Sandstone, white and gray .....	5	910
Sandstone, coarse, gray-brown; oil smell ....	15	925
Sandstone, dark .....	5	930
Sandstone and shale, dark .....	32	962
Shale, dark .....	23	985
Coal .....	5	990
Sandstone, gray and coal mixed .....	5	995
Sandstone, brown .....	5	1000
Sandstone, hard brown .....	25	1025
Sandstone, brown, small oil show .....	10	1035
Sandstone, dark .....	15	1050
Sandstone, dark and shale .....	25	1075



Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black .....	15	1090
Coal .....	5	1095
Coal and fire clay .....	5	1100
Shale, light and dark .....	16	1116
Sandstone, light and dark mixed .....	5	1121
Shale, dark and sandstone .....	8	1129
Sandstone .....	6	1135
Shale and sandstone .....	5	1140
Shale, dark and light .....	4	1144
Shale and coal .....	3	1147
Fire clay and dark shale .....	5	1152
Fire clay and muck .....	6	1158
Shale and sandstone mixed .....	17	1175
Coal and shale .....	10	1185
Shale, soft .....	10	1195
Shale .....	5	1200
Shale, sandy .....	10	1210
Sandstone (water) .....	4	1214
Total depth .....		1214'

Note: This well was completed in the Coal Measures.

#### LOG No. 9.

Pools, No. 3, lessor. Moss Hill Oil & Gas Co., lessee. Location: 2 miles south of White Plains, and  $\frac{1}{2}$  mile from well No. 2 on this farm. Completed: in 1918. Production: at first was about 5 bbls. per day: oil is in this well now, but is not being pumped out, August, 1920. Authority: L. E. Littlepage.

Strata	Thickness	Depth
RECENT		
Clay .....	3	3
Clay and gravel .....	7	10
PENNSYLVANIA SYSTEM.		
Clay, sandy .....	17	27
Shale, hard, limy .....	1	28
Fire clay .....	7	35
Shale, soft .....	25	60
Shale .....	22	82
Shale, hard .....	2	84
Fire clay .....	12	96
Shale .....	7	103
Shale, hard .....	6	109
Shale, sandy .....	36	145
Shale, soft .....	41	186

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, hard, limy .....	2	188
Shale .....	12	200
Shale, hard, limy .....	3	203
Shale, soft .....	5	208
Sand rock, gray .....	42	250
Shale, soft .....	4	254
Shale, hard .....	3	257
Fire clay .....	8	265
Shale .....	75	340
Limestone and shale .....	10	350
Sandstone (oil) .....	10	360
Sandstone, white .....	7	367
Shale .....	5	372
Limestone and shale .....	63	435
Sandstone, (water) .....	5½	440½
Total depth .....		440½

## LOG No. 10.

Pools, No. 2, lessor. Moss Hill Oil & Gas Co., lessee. Location: 2 miles south of White Plains. Completed: in 1918. Production: Flush 20 bbls. pumped; now the well stands 300 feet in oil, August, 1920. Authority: L. E. Littlepage.

Strata	Thickness	Depth
RECENT		
Clay and soil .....	19	19
PENNSYLVANIAN SYSTEM		
Coal .....	1	20
Fire clay .....	13	33
Sandstone .....	7	40
Shale .....	4	44
Shale, hard, limy .....	3	47
Shale .....	43	90
Fire clay .....	6	96
Shale .....	29	125
Shale, hard, limy .....	7	132
Shale .....	37	169
Shale, hard, limy .....	1	170
Shale .....	65	235
Sandstone .....	9	244
Shale, soft .....	1	245
Sandstone .....	5	250
Fire clay .....	3	253
Shale, hard, limy .....	1	254



View of Tanks on the Williams Farm.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale .....	24	278
Shale, hard, limy .....	12	290
Shale .....	27	317
Coal .....	1	318
Shale .....	20	338
Shale (cap rock), hard .....	1	339
Sandstone, (oil) .....	3	342
Sandstone, white .....	1	343
Total depth .....		343

**LOG No. 11.**

Bailey, No. 6, lessor. The Moss Hill Oil & Gas Co., lessee. Location:  $\frac{1}{8}$  mile north of White Plains. Completed: in 1919. Authority: L. E. Littlepage.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	15	15
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, hard .....	10	25
Sandstone .....	10	35
Shale, gray .....	25	60
Sand and shale .....	60	120
Shale, shelly .....	4	124
Shale, brown .....	51	175
Sandstone .....	15	190
Shale .....	50	240
Sandstone .....	20	260
Shale .....	90	350
Shale, shelly .....	5	355

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, (oil) .....	5	360
Shale .....	20	380
Limestone .....	15	395
Shale, brown (pencil cave) .....	155	550
Sand, (water) .....	155	705
Shale .....	10	715
Sandstone, broken .....	15	730
Shale, brown .....	20	750
Sandstone .....	5	755
Limestone, brown, and shells .....	20	775
Shale .....	10	785
Limestone (cap rock) .....	3	788
Sandstone, white, (oil) .....	8	796
Total depth .....		796

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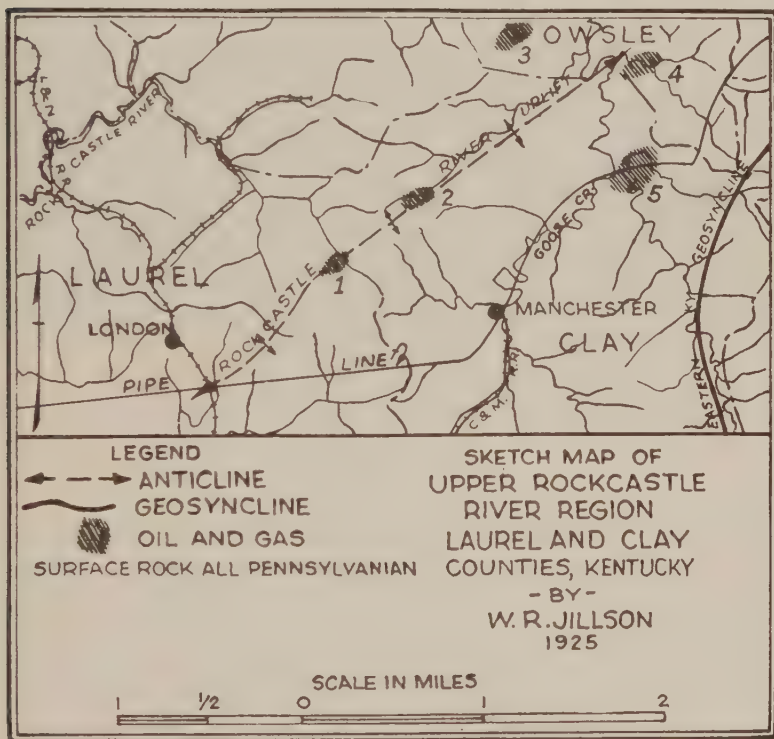


## VII.

### GEOLOGY OF THE ROCKCASTLE RIVER UPLIFT

#### INTRODUCTION.

The region herein to be described is located in the south-western portion of the Eastern Kentucky Coal Field. The



Rockcastle River Uplift is mapped as a unit structure in north-eastern Laurel and northern Clay Counties. Unmapped it extends on a distance into Owsley County. It covers an area somewhat over thirty miles in length by ten miles in width. The Laurel County portion lies slightly east of the Louisville and Nashville Railroad right of way on the headwaters of the South Fork of the Rockcastle River and the headwaters of the Laurel River. The Clay County portion lies on the waters of



Sexton Creek, Big Goose, Island, Laurel, Horse Creek, Upper and Lower Teges Creeks, and the South Fork of the Kentucky River. In Owsley County this structure crosses the lower waters of Buffalo Creek.



FORKS OF ROCKCASTLE RIVER

At the confluence of the headwaters forks of the Rockcastle at Larue post office, the hills recede and the widening meanders of the river have produced a broad and beautiful bottom land.

The major axis of the Rockcastle River Uplift extends along a northeast and southwest line which passes through a point on the Louisville and Nashville Railroad about 31½ miles south of London, and again through Burning Springs, Kentucky. The region, generally, is 120 miles in an air line southeast of Louisville, 70 miles southeast of Lexington, and 140 miles slightly east of south of Cincinnati, Ohio. As has been noted, it is crossed on its southwestern extremity by the main line (Cincinnati to Knoxville) of the Louisville and Nashville Railroad. Towns and stations included within the area are Altamont, East Bernstadt, Pittsburg, London, and Farriston.

The region encompasses an area of about 425 square miles. The field work upon which this report is based was done by the writer and his assistant, Mr. J. S. Hudnall, at various intervals totaling altogether about two and one-half months in 1918 and 1922. The U. S. Geological Survey Manchester and London reconnaissance topographic sheets (scale of 1:125,000) were used

after being photographed to the scale of 1:62,500. These maps were supplemented by regional manuscript drainage base maps of Sexton and other adjoining creeks prepared by L. M. Sellier for Kentucky Geological Survey, Series IV, in 1917 at a scale of one inch to the mile.

Elevations were run with an aneroid barometer on the Manchester (Lily) coal. As no bench marks had been established in the Laurel County portion of this field, an additional aneroid was read at London for checking purposes. In Clay County spirit level bench marks had been established by the Kentucky Geological Survey in 1917. These are described in the "Coals of Clay County\*" and were used for checking purposes. The levels of many of the coal openings in Clay County which are also given in this report were used in conjunction with additional field data in the preparation of the structural map which accompanies this report. Because of the precise levels available in Clay County, this portion of the structural map is regarded as more accurate than that which is located in Laurel County. The structural mapping in Laurel County, however, is regarded as of sufficient accuracy to be used as a safe guide for development in the field.

#### TOPOGRAPHY.

Two quite distinct physiographic areas are traversed by the Rockcastle Uplift. The southwestern portion of the Uplift in the vicinity of London and Farriston is an undulating upland plains region. It is the plateau on which the waters of the Rockcastle and Laurel Rivers and their tributaries rise. Broad valleys rather poorly defined and bordered by some swale land is here the rule. Elevations in this vicinity range from 1,100 to 1,200 feet.

East of the Louisville and Nashville Railroad a number of sandstone capped knobs or ridges set in along the crest of the Rockcastle River Uplift. One of these, Frazier Knob, is 1,540 feet high. Another, Laurel Hill about four miles east of London, is 1,563 feet high, and Raccoon Mountain which forms the head watershed of the Right Fork of the Rockcastle River is somewhat

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\* Coals of Clay County, by P. G. and J. M. Hodges. Ky. Geol. Survey, Series IV, Vol. IV, Part III, 1917. Edition exhausted.

in excess of 1,600 feet above the sea level. These hills essentially coincide with the high points in the main structure and are capped by resistant Coal Measure sandstones. Taken with some high hills located on the northern part of the London sheet and a few



TOP OF THE ROCKCASTLE RIVER UPLIFT

Though a small mountain creek where it crosses the anticline, the Rockcastle River has cut out broad bottoms as are here shown on the farms of Caz Hicks and W. M. Johnson.

isolated knobs found extending to the northeast on the Manchester sheet, which will be described later, these outliers constitute all that is left of the old Cretaceous peneplain.

This old plateau which is now so nearly obliterated, was presumably once continuous with the Cumberland table land of Tennessee. In the London-South region, erosion relentless since the close of the Mesozoic has reduced the soft shaley sediments and developed a second or lower plain on the resistant underlying conglomerates. This is therefore a false or sedimentary plain, entirely local in its extent. Two or three hundred feet below it, on an elevation of about 1,000 feet above the sea level, occurs the Lexington plain which is the great central Tertiary peneplain of Kentucky. This lower plain extends as far south-eastward as Bee Lick in western Rockcastle County, but was not

able to extend quite into the London region because of the occurrence there, as already noted, of the thick resistant conglomerates at the base of the Coal Measures.

Raccoon Mountain is the actual divide between the plateau country in the western portion of this region and the typically incised dendritic drainage of the remaining and larger portion which extends to the northeast. In this northeastern section, except along the crest of the structure and notably in the vicinity of Burning Springs, the physiography is quite characteristic of the Eastern Coal Field. The valleys are narrow and meandering, and become deeper as one progresses towards the South Fork of the Kentucky River. The hills are elongate, with sharp ridges and steep slopes. For the most part they are forested on the top though frequently the timber is cut away for mountain hillside farms, and in such cases is generally given over to the raising of corn.

Two high knobs, Pilot Mountain and Cradlebow Knob, remnants of the high Cretaceous peneplain, each with an altitude in excess of 1,500 feet mark the northwestward extension of the Rockcastle River Uplift in Clay County. Excluding these isolated knobs the maximum relief in this portion of the region is 800 feet. In the London section, excluding such peaks as Frazier Knob and Laurel Hill, the relief is about 150 feet, and in some places less. The highest elevation in the region is on the top of Raccoon Mountain which is an undetermined elevation in excess of 1,600 feet. The lowest elevation is found on the waters of the South Fork of the Kentucky River near the Clay-Owsley County line where low water is about 700 above sea level.

#### STRATIGRAPHY

The rocks exposed to the surface within the region of the Rockcastle River Uplift are all of Pennsylvanian age. They have been subdivided by M. R. Campbell into the Breathitt formation and the Corbin conglomerate. The Breathitt formation is at the surface at London and consists of sandy shale and ferruginous sands, and some coals. The Lily (Manchester) coal mined at Pittsburg, Kentucky, occurs in the lower part of the Breathitt formation and generally about 10 or 20 feet above its base. The Breathitt formation shows a variable thickness of 400 to 500 feet.

The Corbin conglomerate, named from Corbin, Ky., is a pinkish, loosely cemented coarse sandstone conglomerate ranging from 100 to 200 feet in thickness. The Corbin conglomerate is a lenticle occurring at the top of the Lee formation. It may be



BURNING SPRINGS, KENTUCKY

A picturesque mountain village of perhaps some score or more of stores and dwellings, this town owes its settlement to the occurrence of considerable natural gas seepages here in the bed of Sexton Creek.

seen in the bottoms of the Little Laurel and Big Laurel Rivers and some of their tributaries near Farriston Station on the L. & N. R. R. The top of the Corbin generally approximates that of the drainage level, though on the head of the Laurel River and some headwater branches, it is slightly beneath the drainage. The Lily coal usually occurs from 0 to 20 feet above the top of the Corbin formation. The coals occurring above the Lily (Manchester) coal are the Upper and Lower Blue Gem, the Jellico, the Whitesburg, and the Fire Clay Coals. The Fire Clay coal is limited to the region about lower Teges Creek on the South Fork of the Kentucky River, but it may be found in outcrop close to the top of Raccoon Mountain.

In the extreme western portion of this area, two miles west of the railroad, the Corbin and Rockcastle conglomerates occur in their typical cliff forming ledges. In the vicinity of Manchester, and lower down Goose Creek, there is a clifty sandy shale somewhat modified which may be the Corbin, though this is



not definitely proven. This suggestion, however, is supported by the tracing of the Lily coal up Rockcastle River and over on to the waters of the South Fork of the Kentucky River where it was found to be the Manchester Coal.



TILED SANDSTONE AT BURNING SPRINGS

Reversal dips of  $5^{\circ}$  N.  $45^{\circ}$  E. on the Burning Springs Dome are seen as in this view in Sexton Creek within the limits of the town.

In the vicinity of Burning Springs, Clay County, and for a distance of five miles northeast and four miles southwest of this point along the axis of the uplift there are no persistent thick sandstones, and the horizons at which these sandstones occur elsewhere in eastern Kentucky are represented by sandy shales and carbonaceous shales which grade into cannell shales in certain sections. This shaly phase of the rocks in this section is responsible for the low rolling hills around Burning Springs. It is suggestive of a somewhat different condition here during the period of sedimentation as compared generally to the region which adjoins it.

It is, perhaps, not unreasonable to assume that the region where the anticline is located was one of general weakness even in Pottsville times. A small flexing of the depositional floor accompanied by even a small regional uplift during the Pottsville sedimentation might have developed locally sub-insular conditions separated by some little distance from the typical shore or



delta lines so much in evidence but a few miles to the west or east of this region. The fact that cannel shales and carbonaceous shales are formed in semi-quiet waters somewhat removed from continental deposits, lends some strength to this view. In any event the preponderance of shales in this section is at once apparent when contrasted with that of the "off-structure" regions adjoining it, and the very persistency with which these shaly areas follow the crest of the Rockcastle River Uplift is in itself suggestive of some actual relationship. The following section measured on Radder Creek is characteristic of the region generally.

Top of ridge, 1,320 ft. A. T., Bar.  
10 ft. Shale.  
16 ft. 24 in. coal (Jellico-Burns).  
30 ft. Sandy Shale  
20 ft. Clayey Shale.  
10 ft. Covered (Shale?)  
15 ft. Dark Shale.  
10 ft. Coal and Fire Clay (Upper Blue Gem-Wyatt).  
20 ft. Coarse Massive Sandstone.  
30 ft. Shale.  
10 ft. Covered.  
20 ft. Clay Shale.  
3 ft. Coal (Lower Blue Gem).  
35 ft. Sandy Shale.  
25 ft. Sandstone.  
30 ft. Shale.  
2 ft. Coal Blown (Local, Sacker, Dr.)  
40 ft. Black Shale.  
10 ft. Sandstone.  
3 ft. Coal (Lily-Manchester).  
20 ft. Black Shale.  
Drainage.

In the region of the headwaters of the Rockcastle River and northeastward the Coal Measures exhibit a section above drainage of about 300 to 400 feet. A study of several well logs drilled in this vicinity shows the subsurface thickness of the rocks of undoubted Pennsylvanian age to be about 650 feet. The complete thickness of the Coal Measures in this part of Laurel and Clay Counties is therefore about 1,000 feet. The subsurface portion of this group is largely composed of the Lee Formation and the

Rockcastle conglomerate which are known to be of upper Lower Pottsville age.

### MISSISSIPPIAN GROUP

Underlying the sediments of Coal Measure age and separated from them by a very remarkable unconformity, there occurs a series of limestones, shales, and thin sandstones of about 750 feet in thickness which are recognized as of Mississippian age. These rocks are nowhere exposed to the surface within the region of the Rockcastle River Uplift, but are of extreme importance since they contain the "sands" which are regarded as of first economic importance from an oil and gas producing standpoint. The divisions of these rocks as made by Campbell in 1898 and again by Butts in 1922 are indicated in the accompanying table.

### SECTIONS OF THE MISSISSIPPIAN SERIES

GENERALLY APPLICABLE TO EASTERN LAUREL AND NORTHERN  
CLAY COUNTIES, KENTUCKY.

Pottsville Group (Lower Pennsylvanian).

Mississippian of Campbell.	Mississippian of Butts.
Pennington Shale (0 to 150 feet. Red and Green Shales and thin beds of limestones.)	Pennington Formation. (Red and Green Shales and fine grained thin layered sandstone, occasional brown limestone—The correlative of the "Buffalo Wallow Formation" of Western Kentucky.
Newman limestone (225 feet. Blue limestone with nodules of chert and cherty limestone at base.)	Glen Dean Limestone (Blue crinoidal, limestone) Gasper Limestone. (Thickbedded, gray oolitic, crinoidal.) Ste. Genevieve Limestone (thickbedded gray oolitic) St. Louis Limestone (Thickbedded, bluish to gray cherty limestone.)
Waverly formation (350 feet. Greenish, calcareous and argillaceous sandstones. Light blue clay shale with iron concretion at base.)	New Providence Group (Thin bedded shales, limestones and sandstones underlain by soft diagonally cleaving sandstone. (Logan Formation) underlain by green shale with iron nodules and thin shaley sandstones (Cuyahoga Formation).

Chattanooga Shale (Upper Devonian) Chattanooga—Ohio Shale.

Subadjacent to the lowermost strata of Mississippian age occurs the well known Chattanooga Black Shale of upper Devonian age. Well records show this shale to range in thickness from 125 to 140 feet in this region. It is underlain by 20 to 35 feet



A STRONG NORMAL DIP

On the head of the Rockcastle River there are many points such as this where the lower sandstones brought up by the Rockcastle River uplift, show normal dips to the southeast of 3 and 4 degrees.

of light colored calcareous shale, which in turn rests upon a rather harder cherty limestone recognized by drillers as "Irvine sand." This limestone is also Devonian, and is possibly of Hamilton-Onondaga age. It varies from a few feet to 25 or 30 feet in thickness and is underlain by some rather impure limestones of undoubted Silurian age. Campbell has referred this entire group of limestones and shales immediately below the Chattanooga Black shale to the Panola formation. The type locality of outcrop is at Panola Station in Madison County, Kentucky.

At still greater depths underlying the Panola formation occur a long series of limestones, and shaley limestones of green, pink, and grayish color which are of Ordovician age. This latter group includes the well known "Sunnybrook" and "Trenton" oil "sands" which are productive of oil and gas in commercial quantities, southwest of this region in Wayne, Russell, Clinton, Cumberland, and Monroe counties.

## STRUCTURAL GEOLOGY

The Rockcastle River Uplift is an elongated doming anticline. Its general position and antieclinal figure was noted by the writer in 1918 during the course of private field examinations in



REVERSAL ON BURNING SPRINGS DOME

Just east of the Macedonia Baptist Church near Burning Springs post office reversal dips of  $5^{\circ}$  N.  $65^{\circ}$  W. may be seen as above in shaley sandstones at the side of the road.

Clay County, but its formal figure was not completely defined until the Fall of 1922. The major axis of the Rockcastle River Uplift crosses the Louisville and Nashville Railroad  $1\frac{1}{4}$  miles north of Farristown, in Laurel County, and extends in a northeasterly direction across the headwaters of the Rockcastle River into Clay County through Burning Springs, and taking the double between Sexton Creek and the lower tributaries of the Big Goose Creek, it crosses the South Fork of the Kentucky River slightly north of Teges P. O., and proceeds into Owsley County on the lower waters of Buffalo Creek, a distance of over thirty miles.

This great structure culminates in three domes (See map of the Rockcastle River Uplift in Laurel and Clay counties, Kentucky, accompanying this report). 1. Slightly southwest of Brock P. O. on the headwaters of Rough Creek of Laurel River. 2. Near the headwaters of the Right Fork of Rockcastle River. 3. On the headwaters of Spring Fork of Sexton Creek near



Burning Springs. Levelled on the Lily (Manchester) coal as keyed. 1. The Rough Creek Dome is 1,210 feet high. 2. Rockcastle River Dome is 1,220 feet high; and 3, Burning Springs Dome is 1,140 feet high. It will be seen from a comparison of these levels that the Rockcastle River Dome is the highest point on the structure. The western or upper part of the Rockcastle River Uplift gives closure on the 1,140 foot contour. The Rough Creek Dome (No. 1) therefore has a closing reversal of 70 feet; the Rockcastle River Dome (No. 2) has a closing reversal of 80 feet; and Burning Springs Dome (No. 3) closing at 1,120 feet, showing a closing reversal of 20 feet.

The maximum anticlinal reversal of the Rockcastle River Uplift, however, is much greater. On the Rockcastle River a synclinal basin (No. 10) at Chester P. O. shows a minimum elevation of 990 feet, giving a reversal for the Rockcastle River Dome (No. 2) of 230 feet. On the headwaters of the Little Laurel River three miles slightly to the northeast of London minimum synclinal elevations of 1,080 feet are found, giving a full reversal of the Rough Creek Dome (No. 1) of 130 feet. Minimum synclinal elevations of 920 feet are found on Sexton Creek, one mile southeast of Malcolm P. O., giving a maximum reversal for the Burning Springs Dome (No. 3) of 220 feet. A minimum synclinal elevation of 750 feet is found where the structure crosses the South Fork of the Kentucky River. Crestal elevations at this point are 830 feet giving a plain anticlinal reversal, but no closure, of 75 or 80 feet in the vicinity of the Owsley County line.

A study of the structure as drawn on the Lily (Manchester) coal shows that the Rough Creek and Rockcastle River Domes (Nos. 1 and 2) are not only the highest points on the structure, but are the areas of greatest compression. Seventy feet of normal dip and 70 feet of reversal on the Rockcastle River Dome (No. 2) is found within  $1\frac{1}{2}$  miles measured on a line transversed to the major axis of the structure on the Rough Creek Dome (No. 1). The same amount of normal and reversal dip measures  $1\frac{5}{8}$  miles, while on the Burning Springs Dome (No. 3) the first 70 feet of normal reversal dip requires a distance of  $2\frac{3}{4}$  miles.

The Rockcastle River Uplift, though one of the longest, isolated unit structures in Kentucky, bears an additional distinctive

tion in that it is not faulted. Particular attention was given to the possibility of the occurrence of a fault on the north flank of this anticline in accordance with the characteristic of many other large anticlines in Eastern Kentucky, but except for one or two very minor breaks of less than a foot in displacement and of no considerable linear extent, the region may be said to be without any faults. Certainly there are no faults present of a magnitude which might be regarded as detrimental or of importance to the accumulation of petroleum and natural gas in the 'sands' of the region. In the Rockcastle River region compression forces were so great, however, as to incline the strata to 10 and 15 degrees in many places; and it is thought that had the pressure not been released or further compensated elsewhere at the time it was, that this section would logically have been the first to have been faulted. Reasoning in this manner it would be logical to expect one or more faults of considerable size in the structurally unmapped territory to the northwest in Central Rockcastle and Jackson counties. It will be interesting to see what detailed structural work in this northwestern region will ultimately reveal in this connection.

The major axis of the structure from the vicinity of a few miles south of London, proceeds north 50 degrees east generally, with many local fluctuations. The structure when considered as a unit is shaped like an arrowhead pointing to the northeast. It is  $2\frac{1}{2}$  miles wide in the vicinity of the South Fork of the Kentucky River, and in the neighborhood of the Rockcastle River, its apex, it is between 8 to 9 miles wide. While the structure in the region of the South Fork of the Kentucky River is somewhat constricted and plainly anticlinal, it rapidly widens as one proceeds to the west; and includes a number of minor or flanking anticlines, domes, and basin synclines. The domes and anticlines are most conspicuous on the normal dip. The southeastern flank in the vicinity of Manchester shows a small dome, and another in the vicinity of Hooker Branch. The reversal dip shows one low flat doming anticline near Maplesville (No. 7) on Raccoon Creek, and a synclinal dome of very small extent just north of Chestnutburg (No. 4) on the waters of Sexton Creek. This dome at Chestnutburg is regarded as insignificant from an oil and gas standpoint. The northwest flank, or Rockcastle River



Uplift, shows two pronounced basin synclines: one at Chester, P. O. (No. 10) on the Rockcastle River, and one just southeast of Atlanta (No. 9) on the waters of Raccoon Creek. A small dome crosses one-half mile northeast of Viva P. O. (No. 8), but is not regarded as being a part of the main structure since it is separated from the structure by the reversal syncline.

Many striking examples of the influence of the Rockcastle River Uplift on the drainage in this region are to be seen in the field. Some of these may be noted on the map. Within general limits and with the exception of the headwaters of the Rockcastle River, both forks of which cross the main structure transversely, the strata dip with the drainage. It is also noted that in one or two places the principle of stream piracy has operated to modify the headwaters drainage. In Clay County the crest of the structure follows very closely the divide between Sexton Creek and the waters of Goose Creek. In Laurel County the crest follows generally the divide between the waters of the South Fork of the Rockcastle River and the waters of the South Fork of the Kentucky River and the Laurel River.

Grays Fork of Little Goose Creek, however, has stealthily crept over the crest of the anticline and stolen some of the headwaters drainage of the Rockcastle River. In the same way the Rockcastle River has forced its headwaters southeastward across the crest of the main structure, and pirated some drainage areas which formerly belonged to the Laurel River. The Right Fork of the Rockcastle River is now extending its headwaters southeastward and absorbing the drainage of Little Sandy and Mudgut Creeks, tributary waters to the Laurel River. Other notable examples of stream piracy are to be seen on the waters of the South Fork of the Kentucky River where the principle of uplift has operated to advantage and the change of drainage. While the present drainage as pointed out has been largely influenced by the structure of this region, it is only fair at the same time to again call attention to the fact that the principal knobs or mountains of this region: 1. Frazier Knob, 2. Laurel Hill; 3. Raccoon Mt.; 4. Pilot Knob; 5. Cradlebow Knob, and 6. Rice Knob, are the direct product of structural elevation. Raccoon Mountain, which is the highest point in Laurel County west of the Rockcastle-Kentucky River Divide owes its supremacy in

height primarily to the uplift, the crest of which crosses about one-half mile south of the top of the mountain. This isolated knob rises to an altitude in excess of 1,600 feet above sea level



TOWARD THE HEAD OF THE CREEK

There is but little room for roads at the head of the creeks in Eastern Kentucky. This through road from the Rockcastle River on the headwaters of Little Goose Creek, Clay County, was likely enough an Indian trail up until 1800, and is still an important thoroughfare.

The regional dip in the vicinity of the Rockcastle River Uplift is about 30 feet to the mile to the southeast. This calculation being based upon the distance computed at both to the north and south of the structure where the structure itself is not in effect. Along the northwestern reversal flank the dips range from 40 to 225 feet per mile. Locally there are dips also 5 to 15 degrees in the sandstones and shales. Dips of from 5 to 8 degrees were measured in domestic coal banks. It may be said, however, that these dips though steep are not regarded as unusual since they are measured on the reversal flank where inclinations in excess of normal are to be anticipated.

Dips of 5 or more degrees on the normal, or southeastern flank of the Rockcastle River Uplift, are rare; but can be found in close proximity to crests of one or two of the domes. The steepest dips are in the vicinity of lower Teges Creek where it crosses the Kentucky River, Burnings Springs, and on the head of Rockcastle River. Undoubtedly other regions of quite as steep a dip might be found, but these show the steepest dips most

clearly. Since these steep dips occur almost without exception near the crest on the structure, the result is a crestal area of very small extent.

As contrasted with the well defined anticlinal major axis of the Rockcastle River Uplift, the bottom of the reversal syncline in Sexton Creek and in Raccoon Creek shows low, flat dips which are indicative of the strength of the rocks along this line of low structural position. The low dips in this syncline have resulted in broadening it and rendering it somewhat poorly defined. The principal drainage of the reversal syncline follows the waters of Sexton Creek from the vicinity of Alger P. O. southwestward through Chestnutburg and Malcolm over the head of Sexton Creek to the main waters of Rockcastle River in the vicinity of Chester P. O., thence southwestward to the headwaters of Raccoon Creek in the vicinity of Maplesville. At this point the syncline broadens out extending northwestward about four miles to Atlanta P. O. and southwestward with two well defined termini, approaching respectively Pittsburg and London.

While the reversal dips of the Rockcastle River Uplift as have been pointed out fall between 150 and 250 feet to the northwest, the southeast normal dip of the structure as recorded on the Lily (Manchester) coal, extends uninterrupted for 10 or 15 miles. In this distance the coal measure strata fall between 400 and 500 feet into the headwaters of the South Fork of the Kentucky River, where the bottom of the Eastern Kentucky Geosyncline is found. At this point the surface rocks again rise toward the southeast as they approach the Pine Mountain fault.

The subsurface rocks of the Mississippian age, however, though similar in the direction of their dips to the coals of the Pottsville rocks above them, drop down more rapidly. This discordance of dips is due not only to the fact that there is a very great erosional unconformity between the rocks of Mississippian age and Pennsylvanian age, but to the rapid thickening of the Pottsville series as one proceeds to the southeast. The Eastern Kentucky Geosyncline therefore becomes less sharply defined on the rocks of Mississippian age than it is at the surface, and in some cases its synclinal figure may be and probably is entirely lost. The net result of the introduction of these combined principles of unconformity and thickening is the extension of the

normal dip of the oil and gas "sands" of Mississippian age underlying the Rockcastle River Uplift, to the southeast to the Pine Mountain fault; or to where some now unknown structure results in a reversal.

Though little concentrated drilling has been done on the Rockcastle River Uplift except in the vicinity of Burning Springs, some interpretations of the subsurface structure of this region have been made by the use of a few outlying wells. In making these computations the A. J. Brock and the V. J. Martin wells were used as was the well at Atlanta P. O. A few scattered wells on the headwaters of Gray's Creek were also used. It is found that the Lily (Manchester) coal is found at about 565 feet on the head of Mize Branch on Laurel River. At and near Atlanta P. O. on Little Raccoon Creek it is but 550 feet. The interval is approximately 700 feet on the head of the Little Sandy Creek of Laurel River, and comparisons with other wells drilled in on the waters of Goose Creek and the South Fork of the Kentucky River show a pronounced increase in the interval between the Lily (Manchester) coal and the top of the Big Lime.

This striking increase in interval amounts to as much as 15 feet per mile in the vicinity of the major structure. The rate of increase doubtless is much greater further to the southeast. It is known to be somewhat greater on the Right Fork of Sexton Creek where the interval is approximately about 700 feet. Conclusions derived from this increase of interval seem to indicate a general shortening of the Coal Measure section as the crest of the Rockcastle Uplift is approached. It would seem that the subsurface structure as mapped on the Big Lime is at least 100 or 150 feet higher along crestral structural positions as at Burning Springs, than it should be to correspond exactly with the configuration of the surface structure as worked on the Lily (Manchester) coal.

The high point of the Mississippian structure is also apparently slightly offset to the northwest, as compared to the surface structure. It must be said, however, that due to insufficient data especially along crestral positions in Laurel County these inferences with respect to the subsurface structure should be taken more in the nature of an hypothesis than as an actually demonstrated fact. If upon the completion of considerable drilling at



other strategic points on the structure it is found that the Mississippian fold is proportionately higher along this crest, and that its crest actually offsets the surface structure. It will have been established that in this locality, as in some other localities



REVERSAL ON THE HEAD OF LITTLE GOOSE CREEK

The view is to the east at the side of the road to Folger post office on the head of the Wyatt Branch of Little Goose Creek. Reversal dips of  $3^{\circ}$  and  $4^{\circ}$  on even bedded sandstones are found here on the farm of J. D. Greer.

in Eastern Kentucky, particularly in Whitley, Johnson and Magoffin counties, the subsurface structure has been folded twice, the age of the first fold being Post Chester, and the latter Post Pottsville.

If double folding has actually taken place in the region of the Rockcastle River Uplift, it will have operated to bring into bolder relief the subsurface structure in which the prospective oil and gas "sands" of the region occur, and will serve to increase theoretically the gas pressure and the possible size of the oil wells of the field. At the same time it definitely restricts both the productive area of the gas field and the oil field.

In a structure as large as the Rockcastle River Uplift it must be assumed in advance of drilling to any considerable extent, that the minor structures on both the Northwestern and Southeastern flanks will somewhat control the migration of petroleum and the accumulation of natural gas. As has already been pointed out the Southeastern flank exhibits a strong normal

dip and shows more relative movement than does the dip of reversal. It is impossible now, however, to predict which if any of the minor folds have played the most important part in the accumulation of commercial amounts of oil and gas. The impossibility of doing really refined, structural mapping in this area due to the inadequacy of the base maps available will be felt somewhat by the oil and gas prospector in the development of this field, and as between the reversal and normal dip flanks it may be said that the area from the major axis of the structure to the Northwest has been given more attention in the field in order to more clearly define the surficial configuration of the uplift. Since the field work was done under great difficulties, it is only just to point out that at some later date with accurate topographic base maps prepared at a scale of 1:62,500, it will undoubtedly be found that the figure of the Rockcastle River Uplift will be somewhat modified from the presentation of the map accompanying this report. It will undoubtedly be extended further to the northeast and it is possible, though it is not stated as a positive fact, that it will be extended further to the southwest. This seems not at all unlikely for a number of reasons, chief of which are the noted occurrence of strong reversals near the mouth of Spruce Creek of Laurel River, and are directly southwest of Farriston in line with the axis of Rockcastle River Uplift. It should also be pointed out that elsewhere in Eastern Kentucky structures of as great importance as the Rockcastle River Uplift and extending continuously without a break a distance of from 30 to 40 miles do not in any instance end quite as abruptly as the Rockcastle River Uplift seems to end in the vicinity of Farriston. This uplift has characteristics of a major structural feature of Eastern Kentucky, and the writer feels in the absence of any detailed structural work to the southwest that a continuation of this uplift in some more or less well defined figure will eventually be found and mapped.

#### DEVELOPMENT

At various intervals since 1898 about 20 to 25 wells have been drilled in the vicinity of the Rockcastle River Uplift. Most of these wells have been drilled in closely adjoining Burning Springs in Clay County. Some scattered "wild-cat" locations



have been drilled on the lower waters of Sextons Creek and on the South Fork of the Kentucky River and its tributaries in the vicinity of Oneida. Some of the latter wells drilled on Red Bird and Bullskin Creek by the Oneida Oil and Gas Co. were very



FIRST BURNING SPRINGS GASSER

The well was drilled between 1898-1900 on the L. M. Rawlings farm at Burning Springs, Clay County, Kentucky, to a depth of about 2,200 feet. It produced large quantities of natural gas, but since there was no market for the gas the well was plugged and abandoned. Seepage gas from this well is now being used.

good gassers. Others on the waters of Goose Creek in the vicinity of Manchester, and still others on the headwaters of Laurel River and outlying branches of the Rockcastle River have been gas wells of varying importance. A few wells have been drilled on the head of Grays Fork of Little Goose Creek, and one was located on the head of Mill Creek near Fulger.

With exception of the productive and commercially important natural gas wells which have been drilled in the vicinity of Burning Springs in Clay County, most of the other wells actually drilled on this structure may be said to have been commercially unimportant in their oil and gas production, or else dry holes. Very little accurate data with respect to these drillings has been reported, but such information as it has been possible to secure from various sources is given herewith in the order that the wells were drilled. The writer wishes to acknowledge his obligation to Doctors G. P. Webb and H. C. Hornsby

of Burning Springs through whose kindness he personally secured much of the development data here presented.

1. In 1898 the Brigall Oil and Gas Company organized in Pennsylvania, drilled the first well in the Burning Springs vicinity on the L. M. Rawlings lease just above the town. Drilling was managed by Mr. Brigall, and the hole is reported to have been drilled to a depth of about 2,200 feet by the use of a Standard rig. It is one of the deepest if not the deepest wells in this immediate vicinity. Gas was produced in large quantities but the well was never gauged. It was also allowed to blow open for a long time, and was finally closed in. It is producing gas today for domestic and commercial use in the village of Burning Springs.

2. Five years later, in 1903, a well was drilled on the M. M. Webb farm on Sextons Creek. It produced a small amount of oil and some gas from a depth of about 1,100 feet. A portable rig was used, the drilling being done by Oscar Willison of Washington, D. C. The well was finally abandoned.

3. During the same year (1903) a well was drilled on the C. C. Shell farm of Sextons Creek which produced a small amount of oil and some gas at a depth of about 1,100 feet. This well was also drilled by Willison. It was also abandoned.

4. During the following year (1904) John Eaton drilled a well on J. L. Rawlings farm on Durham Branch just above the village of Burning Springs to a depth of about 2,000 feet, using a Standard rig. A small amount of gas was secured.

5. Following the completion of the Durham Branch well, Eaton moved on to the E. C. Rawlings farm on Goose Hollow of Burning Springs Fork of Sexton Creek just northwest of Burning Springs, and in the same year, 1904, drilled in a large gas well at a total depth of 700 feet. This well was gauged at several million feet flush and the rock pressure is reported to have been 285 lbs. This well is now used for domestic purposes in the Burning Springs vicinity. It is owned by the Dulin Oil and Gas Company.

6. In 1904, a well, which was later abandoned, was drilled in at Folger Town on the farm of James Benge on the headwaters of Mill Creek of Rockcastle River, by a Mr. Brown. Its depth is unknown.

7. In 1905 John Eaton drilled in a good gas well on the T. C. McDaniel farm on Burning Springs Fork of Sextons Creek about  $1\frac{1}{4}$  mile below Burning Springs. He used a Standard rig, and drilled to a depth of about 1,200 feet.



A DESERTED MOUNTAIN CABIN

With the passing of the wealth of broad leaf timber which once stood in Laurel and Clay Counties, the soil of the steep hillsides has become badly washed and impoverished. Countless families once independent in their physical comforts have been forced to move on.

8. In the same year, 1905, Captain John A. Geary of Lexington, Kentucky, drilled a small well on the farm of Tom Bonds on Pine Lick Branch of Gum Fork of Sextons Creek. The well was abandoned.

9. After drilling the Bond well Captain Geary in 1905 drilled a well just above the mouth of Laurel Creek of Goose Creek to a depth of about 1,200 feet. This well was dry and abandoned. A portable rig was used.

10. In the same year (1905) a well was drilled on the H. L. Morgan farm  $1\frac{1}{2}$  miles above Goose Creek of Laurel River Creek. This well was unproductive and abandoned.

11. In 1909 Captain John A. Geary of Lexington and Whitley City, Kentucky, drilled a well near Tan Yard School, on the farm of Vincent Bowen heirs, on the headwaters of Grays Fork of Little Goose Creek to a reported depth of about 1,300 feet. This well it is said produced a small amount of gas and

some black oil at a depth of 250 to 300 feet. It was finally plugged and abandoned.

12. One-half mile north of the Bowen well, Captain Geary drilled two wells on the Dr. I. C. Wyatt farm on Wells Branch of Grays Fork of Little Goose Creek, about 1912. One of these wells was about 1,100 feet deep and the other about 750 feet in depth. One of these wells is reported to have produced a little oil, but both were abandoned. In 1914 Captain Geary reported the records of these wells had been lost.

13. The Dulin Oil and Gas Company undertook operations in this field in 1912 drilling a well on the J. H. Clark farm just above the mouth of Gun Fork of Sextons Creek at a depth of about 1,500 feet. It is recorded that a small amount of oil and gas production was secured. A standard rig was used, and two wells were drilled through to the "Irvine sand."

14. In the following year, 1913, the Dulin Oil and Gas Co. of Lexington, Ky. drilled a small gasser on the Dr. Hornsby farm. This well was later abandoned. It was located just above the mouth of Burning Springs Fork of Sextons Creek.

15. In 1914 the Dulin Oil and Gas Co. drilled in a good gasser at a depth of 700 feet on the E. Froman farm on Goose Hollow a branch of the Burning Springs Fork of Sextons Creek. The gas was cased off and the drilling was continued to a depth of 1,500 feet, but oil was not found.

16. In 1914, a dry hole was drilled by the Dulin Oil and Gas Co. to a depth of 1,500 feet on the Nathan Sparks farm on Fox Branch of Sexton's Creek, 6 miles northwest of Burning Springs. It is reported that the well stopped in the "Irvine sand."

17. In the same year, 1914, Charles Snyder, of Chicago, Illinois, drilled a well to a depth of 1,200 feet on the D. C. Sizemore farm two miles above the mouth of Sexton's Creek. The well was a dry hole and was abandoned.

18. Another well was drilled on the N. C. Potter farm on Blue Sow Branch of Grays Fork of Little Goose Creek in the winter of 1917 and 1918 to a depth of 2,202 feet. Dan White of Manchester was in charge of the drilling which was done with the standard rig, and Silas Mann was the contractor. The well



is reported by S. L. Nicholson to have produced a small amount of gas.

19. Later, in 1918, the Ohio Oil Company drilled in the Jasper Mize No. 1 well on Mize Branch of Laurel Creek to a



THE JACK BROCK NO. 1 WELL

This well was drilled by the Petroleum Exploration Company on the head of Little Sandy Creek of Laurel River in the spring of 1921 to a depth of 1,725 feet. Only small amounts of oil and gas were secured and the well was plugged and abandoned.

depth of about 1,500 feet. A portable rig was used. The well was dry and was abandoned.

20. In the fall of 1920 the Petroleum Exploration Company drilled in the V. J. (Willie) Martin No. 1 well on the head of Mudgut Creek of Laurel River to a total depth of about 1,812 feet. The well is reported to have had some shows of oil and gas, but was plugged and abandoned as a dry hole.

21. In the Summer of 1921 the Petroleum Exploration Company drilled in the Jack Brock No. 1 on the head of Little Sandy Creek of Laurel River to a total depth of 1,725 feet, and a small amount of oil was produced at a depth of 300 feet, and a little gas at an unknown depth. The well was abandoned.

#### HISTORICAL.

The occurrence of natural gas on the Rockcastle River Uplift in the vicinity of Burning Springs was known to the Indians prior to the coming of the first white settlers in this portion of

Clay or Laurel Counties. The first white hunters in this vicinity found at Burning Springs implements of the Indians as well as animal skeletal material indicating that the aborigines had probably made use of the natural gas for cooking purposes. During the period of the settlement of this region forest and grass fires frequently set fire to the escaping natural gas along the sides of Spring Fork of Sextons Creek in the vicinity of what is now the village of Burning Springs.

The natural gas seepage in this vicinity occurs in front of the residence of Dr. H. C. Hornsby. This spring has been known to white men for at least 150 or 200 years. It was used by the early hunters of this region who constructed a rude platform about it and used it for drying wild meat. The natural gas seepages at Sacker springs, one and a half mile northeast of Burning Spring postoffice occur on the land of N. C. Potter and are surrounded by the farm of John Combs. The location is just south of Sacker schoolhouse. The Burning Springs gas springs were used during the early days for drying purposes. Later about 1885 these gas springs were first used commercially for heating a church. Several disastrous fires resulted from the early careless use of natural gas for heating purposes, and as a result practically no attempt was made to use the natural gas in a larger way until after the drilling in of the well on the Rawlings farm in 1898 near Burning Springs, Kentucky.

### WELL RECORDS

#### WELL LOG No. 1.

#### LAUREL COUNTY

Location: 12 miles S. W. of London, Laurel County, Ky. Commenced: ——— Completed: Aug. 1896. Operator: ——— Sweeney.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM.</b>		
Sandstone .....	16	16
Shale .....	4	20
Sandstone, hard .....	5	25
Sandstone, soft .....	20	45
Shale .....	40	85
Coal .....	1	86
Sandstone, white .....	125	211
Shale .....	70	281
Coal, Cumb. Valley.....	4	285
Shale .....	26	311



Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM.		
Limestone "Big Lime" .....	265	576
Sandstone and Limestone .....	20	596
Limestone, hard .....	10	606
Shale, black .....	90	696
Limestone * .....	23	719
Limestone, black sandy .....	13	732
Shale .....	10	742
Shale, blue .....	235	977
Shale, black .....	55	1032
Shale, red .....	50	1082
Shale, white .....	10	1092
Shale, red .....	20	1112
Shale, green .....	20	1132
Sandstone "Gas sand" .....	25	1157
Limestone .....	347	1504
Total depth .....		1504'

## WELL LOG No. 2.

A. J. Brock, No. 1, lessor. Petroleum Exploration Co., lessee.  
 Location: Headwaters of Little Sandy Creek, one mile southeast of  
 Brock P. O., Laurel County, Kentucky. Commenced: May 31, 1921.  
 Completed: July 9, 1921. Initial Production: Dry hole. Casing head  
 8 $\frac{1}{4}$ " 170 ft., casing head 6 $\frac{5}{8}$ " 837 feet. All pulled. C. H. E. 1,225 A. T.,  
 Bar.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM.		
Mud .....	11	11
Sand, shaley .....	5	16
Slate, blue .....	29	45
Sand (fresh water) .....	65	110
Slate, blue, and lime .....	50	160
Sand .....	40	200
Slate, blue .....	40	240
Sand, first salt .....	60	300
Slate, black .....	50	350
Sand, second salt (show oil) .....	120	470
Slate, blue .....	30	500
Sand, third salt .....	140	640
MISSISSIPPIAN SYSTEM.		
Slate, blue and lime .....	197	837
Limestone (Big Lime) .....	123	960
Slate, white .....	25	985

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Lime, blue (hard) .....	265	1250
Slate, white .....	130	1380
DEVONIAN SYSTEM.		
Shale, brown .....	140	1520
Shale, light .....	20	1540
Slate, white .....	60	1600
Lime, gritty .....	125	1725
Total depth .....		1725'

Note: Drilled fresh water well near this location to the depth of 51 feet.

#### WELL LOG No. 3.

Vicy J. Martin, No. 1, lessor. Petroleum Co., lessee. Location: Headwaters of Mudgut Creek, 3 miles east of Brock P. O., Laurel Co. Ky. Commenced: March 10, 1921. Completed: May 14, 1921. Initial Production: Dry hole. Casing Head: 8½ in. 68 ft.; 6⅝ in. casing head (17,) 818 ft. All pulled. C. H. E. 1225 A. T., Bar.

Strata	Thickness	Depth
RECENT		
Mud, brown .....	8	8
PENNSYLVANIAN SYSTEM.		
Shale, sandy .....	2	10
Shale, blue .....	50	60
Shale, soft .....	30	90
Sandstone, (water) .....	20	110
Shale, blue .....	60	170
Shale, blue .....	30	200
Sandstone, "First Salt" .....	50	250
Shale, black .....	25	275
Sandstone, "Second Salt" .....	60	330
Shale, blue .....	65	400
Shale, and blue limestone .....	100	500
Sandstone, "Third Salt" .....	140	640
Shale, black .....	20	660
MISSISSIPPIAN SYSTEM.		
Sandstone, "Maxon" .....	10	670
Shale, black .....	20	690
Shale, pink .....	10	700
Limestone, "Little Lime" .....	20	720
Shale, pink .....	5	725
Shale, light .....	115	840
Limestone, "Big Lime" .....	215	1055
Shale, "Fire Clay" .....	20	1075

Strata	Thickness	Depth
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, gritty .....	50	1125
Shale, black .....	25	1150
Shale, white .....	25	1175
Limestone, blue .....	150	1325
Shale, white .....	15	1340
Limestone, gritty .....	75	1415
Shale, "Fire Clay" .....	10	1425
<b>DEVONIAN SYSTEM.</b>		
Shale, brown .....	140	1565
Shale, white .....	20	1585
Limestone, shelly .....	5	1590
Shale, "Fire clay" .....	10	1600
Limestone (Cap Rock) .....	5	1605
Limestone .....	79	1684
Limestone, gritty .....	128	1812
Total depth .....		1812'

**WELL LOG No. 4.**

Zach Allen, No. 1, lessor. Piney Oil and Gas Co., Williamsport, Pa., lessee. Location: Southwest of Clay County line about 4,500 feet on Laurel County side of Right Fork of Rockcastle River. Commenced: April 10, 1923. Completed: June 15, 1923. Production; Natural gas, 250,000 cu. ft. gauged open flow with 165 lbs. R. P. Well closed in and capped. C. H. E. 1,319 feet A. T.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil .....	3	3
Shale .....	42	45
Sandstone, water .....	12	57
Shale .....	48	105
Sandstone .....	64	179
Shale .....	25	204
Sandstone .....	45	249
Shale .....	10	259
Sandstone and shale .....	87	346
Sandstone .....	104	450
Shale, brown .....	65	515
Sandstone .....	14	529
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, pink .....	6	535
Shale, sandy .....	35	570
Shale, pink .....	15	585
Limestone, black .....	20	605

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Limestone, shale .....	42	647
Limestone, gray. 660 ft. of 6 $\frac{5}{8}$ " .....	84	731
Limestone, white. 1 gas at 738 .....	19	750
Limestone, brown .....	40	790
Sandstone, with lime 2nd gas at 827 .....	40	830
Limestone, blue (flinty) .....	10	840
Shale .....	14	854
Limestone, blue .....	56	910
Limestone, blue .....	185	1095
Shale, blue .....	14	1109
Limestone, blue .....	20	1129
Shale, blue .....	21	1150
Limestone, gray .....	5	1155
Shale, lime blue .....	30	1185
Shale, black .....	54	1239
DEVONIAN SYSTEM		
Shale, brown .....	84	1323
Shale, "Fire Clay" .....	5	1328
Limestone .....	52	1380
SILURIAN SYSTEM		
Shale, blue .....	21	1401
Limestone, brown .....	50	1451
Limestone, dark .....	16	1467
Limestone, blue .....	58	1525
Limestone, brown .....	25	1550
Limestone, blue .....	59	1609
Limestone, brown .....	9	1618
Limestone, blue .....	48	1666
Limestone, (fossils) blue .....	4	1770
Limestone, (gritty) brown .....	23	1793
Limestone, blue .....	34	1827
Limestone, (gritty) brown .....	13	1840
Limestone, blue (fossils) .....	217	2057
Limestone, brown .....	35	2092
Limestone, brown .....	28	2120
Total depth .....		2120
Casing record 8 $\frac{1}{4}$ " casing 20 ft.; 6 $\frac{5}{8}$ " casing 660 ft.		

## WELL LOG No. 5.

W. F. Barrett, No. 1, lessor. Standard Oil Co., lessee. Location:  
Commenced: November 7, 1925. Drilled by Dearolph & Wade.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	10	10
<b>PENNSYLVANIAN SYSTEM</b>		
Shale .....	17	27
Sandstone .....	143	170
Shale .....	185	355
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone .....	20	375
Shale .....	20	395
Limestone .....	40	435
Shale (Pencil Cave) .....	5	440
Limestone, "Big Lime" .....	210	650
Shale, brown .....	25	675
Limestone and sandstone—very hard.....	55	730
Shale, blue .....	90	820
Sandstone, (oil at 763) .....		
Limestone, green, hard .....	50	870
Shale, blue .....	20	890
Shale, green .....	10	900
Limestone, green, hard .....	40	940
Shale, white, soft .....	5	945
Shale, blue, soft .....	20	965
<b>DEVONIAN SYSTEM</b>		
Shale, soft, brown .....	112	1077
Fire Clay, white .....	48	1125
Limestone, gray .....	7	1132
<b>SILURIAN SYSTEM</b>		
Shale, blue .....	30	1162
Limestone, gray, very hard .....	28	1188
Limestone, light gray hard .....	16	1204
Shale, green, soft .....	11	1215
Limestone, gray, hard .....	100	1315
Shale, blue, soft .....	5	1320
Limestone, gray, hard .....	2	1322
Total depth .....		1322

Note: Well was shot from 1,204 to 1,180 feet.

8¼ casing 27 ft. 6½ casing 411 ft. 5 3-16 casing 500 ft.

#### WELL LOG No. 5A,

Lee Parker, Lessor. Location: At Mershons, Laurel County, Ky.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	4	4



A Clay County Gasser Near Oneida.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale .....	30	34
Sandstone .....	10	44
Shale .....	16	60
Sandstone .....	10	70
Shale .....	14	84
Coal .....	2	86
Shale and sandstone .....	155	241
Coal .....	3	244
Shale .....	8	252
Sandstone .....	25	277
Shale .....	5	282
Sandstone .....	20	302
Shale and sandstone .....	32	334
Sandstone .....	57	391
Shale .....	11	402
Coal .....	2	404
Sandstone, hard, shelly .....	3	407
Shale .....	13	420
Sandstone .....	20	440
MISSISSIPPIAN SYSTEM		
Limestone, dark .....	10	450
Shale .....	16	466
Limestone .....	74	540



Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale .....	5	545
Limestone, hard .....	17	662
Limestone, soft .....	33	695
Shale, green .....	60	755
Shale, white .....	129	884
Limestone, blue .....	7	991
Shale, white .....	58	1049
DEVONIAN SYSTEM		
Shale, black .....	128	1177
Sandstone, "Corniferous" .....	7	1184
Shale, and blue limestone .....	36	1220
Shale, and limestone .....	57	1277
Total depth .....		1277

## WELL LOG No. 6.

## CLAY COUNTY

Leveaga Hubbard No. 1, lessor. Piney Oil & Gas Co., lessee.  
 Location: Crawford, Clay County, Ky., near forks of Rockcastle River.  
 Commenced: June 29, 1923. Completed: Aug. 8, 1923. Contractors:  
 Ensslin & Ensslin.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil .....	12	12
Shale (set 24 ft., 8¼ casing) .....	20	32
Coal .....	2	34
Sandstone (fresh water at 30') .....	60	94
Shale, sandy .....	116	210
Sandstone .....	54	264
Shale .....	46	300
Sandstone .....	45	345
Shale, sandy .....	91	436
Sandstone .....	104	540
Shale .....	60	600
Sandstone .....	8	608
Shale .....	6	614
MISSISSIPPIAN SYSTEM		
Shale, red .....	6	620
Shale, red and dark .....	84	704
Shale and limestone .....	42	746
Limestone, gray and black .....	37	783
Limestone, gray .....	37	820
Limestone, white .....	10	830
Limestone, sandy, brown, gas 927 .....	98	928

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale .....	3	931
Limestone, blue, flinty .....	54	985
Total Depth .....		985

755 ft. 6 $\frac{5}{8}$  casing shut off all water, and the hole carried to 985 ft. Quit 6 $\frac{5}{8}$  hole.

#### WELL LOG No. 7.

W. J. Ledford No. 1, lessor. Standard Oil Co. of Kentucky, lessee. Location: On Harper Branch of Goose Creek, Clay County, Ky. Commenced: November 1, 1924. Completed: December 2, 1924. Contractors: Randell & Fitch. Production: Natural gas, 3,200,000 cubic feet open flow, approximately, with rock pressure of 285 lbs. On March 1, 1925 by actual measurement of agent of Gasoline Recovery Corporation this well produced 2,853,000 cu. ft. according to report.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil .....	7	7
Shale, blue .....	38	45
Sandstone, light, hard .....	105	150
Shale, soft, dark .....	150	300
Sandstone, light, hard .....	260	560
Shale, dark, soft .....	20	580
Shale, red, soft .....	20	600
Shale, dark, soft .....	15	615
Shale, red, soft .....	35	650
Sandstone, medium dark .....	20	670
Shale, soft, dark .....	45	715
Shale, light, soft .....	5	720
MISSISSIPPIAN SYSTEM		
Limestone, gray, hard, sandy .....	15	735
Shale, blue, soft .....	20	755
Shale, dark, medium sandy .....	40	795
Limestone, "Big Lime" casing 822 .....	200	995
Sandstone, soft "Big Injun" .....	15	1010
Shale, soft, red .....	90	1100
Shale, soft, blue .....	180	1280
Shale, soft, light .....	20	1300
DEVONIAN SYSTEM		
Shale, soft, black .....	173	1473
Shale, soft, brown .....	15	1488



#### REVERSAL ON ROCKCASTLE RIVER

This view showing strong sandstones in reversal dips of 3 to 5 degrees may be seen near the forks of the Left Fork of Rockcastle River. Reversal dips to the northwest of 7° and 8° are also to be seen in this locality.

Strata	Thickness	Depth
<b>DEVONIAN SYSTEM</b>		
Shale, hard, black .....	5	1493
Limestone "Irvine Sand" .....	27	1520
Total depth .....		1520

Note: Natural gas was produced from 1,488 to 1,506 feet in depth.

#### WELL LOG No. 8.

John Meade No. 1, lessor. National Refining Co., lessee. Location: Lower Teges, Clay County, Ky. Commenced: Sept. 1925. Completed: Nov. 1925. Drilled by H. O. Randel. Hole dry, plugged, pulled and abandoned. A small amount of gas in the bottom of the "Big Lime." The showings of oil were just rainbows and it is doubtful if it came from the sand or from the bucket in which the sample was washed out, as it showed grease around the edge which looked to me like some machine oil had been put into the bucket at some time while being used around the rig.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil, yellow .....	3	3
Clay, yellow .....	7	10
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, gray .....	27	37
Shale, blue .....	30	67

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, gray .....	3	70
Shale, blue .....	6	76
Sandstone, gray .....	3	79
Shale, blue .....	10	89
Sandstone, gray .....	5	94
Shale, blue .....	61	155
Sandstone, gray .....	4	159
Shale, blue .....	7	166
Sandstone, gray .....	3	169
Shale, blue .....	6	175
Sandstone, gray .....	82	257
Shale, black .....	10	267
Sandstone, gray .....	144	411
Shale, blue .....	49	460
Limestone, black .....	7	467
Shale, blue .....	73	540
MISSISSIPPIAN SYSTEM		
Limestone, black .....	6	546
Shale, blue .....	14	560
Limestone, "Little Lime," black .....	12	572
Limestone, gray, "Little Lime" .....	17	589
Limestone, black .....	6	595
Limestone, gray, "Big Lime" .....	230	825
Shale, white .....	10	835
Shale, green .....	20	855
Shale, red .....	54	909
Shale, gray .....	61	970
Limestone, gray .....	3	973
Shale, gray .....	20	993
Limestone, gray .....	2	995
Shale, gray .....	135	1130
DEVONIAN SYSTEM		
Shale, brown .....	} "Chattanooga" {	1266
Shale, gray .....		1277
Shale, black .....		1285
Limestone, gray .....	9	1294
Limestone, gray .....	5	1299
Limestone, black .....	9	1308
Limestone, dark gray, oil show .....	4	1312
Limestone, gray .....	8	1320
Limestone, gray, oil show .....	5	1325
SILURIAN SYSTEM		
Limestone, gray .....	4	1329
Limestone, black .....	5	1334

Strata	Thickness	Depth
<b>SILURIAN SYSTEM</b>		
Limestone, black H. H. ....	13	1347
Limestone, L. gray, sandy .....	19	1366
Shale, gray .....	15	1381
Shale, gray .....	124	1505
Shale, red .....	45	1550
Shale, gray .....	45	1595
Limestone, blue .....	48	1643
Shale, gray .....	9	1652
Limestone, blue .....	65	1717
Limestone, black H. H. ....	15	1732
Shale, black .....	10	1742
Total Depth .....		1742

**WELL LOG No. 9.**

Mobray Robinson, lessor. Petroleum Exploration, lessee. Location: Near Cradle Bow, Clay County, Ky. Commenced: Sept. 1, 1924. Completed: Nov. 18, 1924. Contractor: C. E. Dearolph. Drillers: F. D. Coon and F. W. Wade. Dry hole.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	4	4
<b>PENNSYLVANIAN SYSTEM</b>		
Shale and shells .....	26	30
Shale .....	40	70
Coal .....	4	74
Shale .....	16	90
Limestone, shelly .....	25	115
Shale and shells .....	205	320
Sandstone, little gas at 330 .....	245	565
Shale .....	10	575
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, sandy, "Red Rock" .....	6	581
Limestone, shelly .....	10	591
Shale .....	10	601
Shale, sandy "Red Rock" .....	25	626
Shale, sandy .....	88	714
Limestone .....	11	725
Shale .....	15	740
Limestone "Big Lime" .....	115	855
Shale, green .....	50	905
Shale, sandy "Red Rock" .....	5	910
Shale .....	20	930

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, sandy "Red Rock" .....	10	940
Shale .....	350	1290
DEVONIAN SYSTEM		
Shale, black, gas at 1,345 .....	150	1440
Shale, "Fire Clay" .....	5	1445
Shale, black .....		1452
Limestone, "Corniferous," gas at 1,475.....	60	1512
Shale, blue .....	18	1530
Total depth .....		1530

10" casing 35'. Left in hole 19 ft. 6 $\frac{5}{8}$ " casing, X 17 lb., 814, and pulled out. Gas 1,345. Gas 1,475. Authority: Petroleum Exploration.

#### WELL LOG No. 10.

J. H. Clark, No. 1, Lessor.

Dulin Oil and Gas Co., Lessee.

Location: Just above mouth of Gum Fork of Sextons Creek.

Production: Small oil, green, 1335 to 1360, Nat. Gas at 1337 measured 100,000 cu. ft.

Rig: Standard.

Sands: Salt sand in coal measures about 200 feet thick.

Date: 1917-1918.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM.		
Soil, sandstone, shale & coal .....	525	525
MISSISSIPPIAN SYSTEM.		
Limestone, white .....	75	600
Shale, brown .....	4	604
Shale, blue .....	6	610
Limestone (Big Lime) .....	161	771
Shale, soft .....	11	782
Sandstone, bluish .....	58	860
Shale, blue .....	10	870
Shale, red .....	5	875
Shale, blue (New Providence) .....	303	1178
DEVONIAN SYSTEM.		
Shale, brown.....	125	1303
Shale, white.....	15	1318
Shale, brown.....		1330
Limestone (cap) .....	5	1335
Limestone (Corniferous) .....	25	1360
Total depth .....		1360



Note: The log of the J. H. Clark No. 2 well was similar to No. 1. The J. H. Clark No. 2 produced 1,100,000 cubic feet of natural gas from the Corniferous "sand." The Rawlston No. 1 drilled in 1902 to a total depth of 1267 feet produced 3,800,000 cubic feet of natural gas from the "Big Injun" sand. Authority: Charles R. Dulin, St. Petersburg, Florida.

#### WELL LOG No. 11.

James Hignite, No. 1. Lessor. Coleman Benton, Lessee. Location: Little Bullskin Creek,  $1\frac{3}{4}$  miles east of Oneida, Clay County, Ky. Commenced: May 15, 1925. Completed: July 9, 1925. Production gas estimated 150 thousand and oil show. Drilled by H. O. Randel, contractor. C. H. E. 790 A. T. Plugged and abandoned.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil, sand, gravel .....	9	9
Limestone, gray (Wooden conductor, 12 ft.) .....	1	10
Shale, blue .....	14	24
Coal, black .....	1	25
Shale, blue .....	40	65
Sandstone, brown .....	124	189
Shale, blue .....	4	193
Sandstone, gray .....	119	312
Coal .....	1	313
Sandstone, gray (10" casing 424 ft.) .....	122	435
Coal .....	3	438
Sandstone, gray .....	27	465
Limestone, black .....	5	470
Sandstone, brown .....	35	505
Shale, blue .....	15	520
Limestone, gray .....	5	525
Shale, blue .....	20	545
Sandstone, gray .....	20	565
<b>MISSISSIPPIAN SYSTEM</b>		
Shale (Red Rock) .....	40	605
Shale, blue .....	55	660
Shale (Red Rock) .....	15	675
Limestone, gray .....	25	700
Shale, blue (8" casing 826 ft.) .....	27	727
Limestone, gray .....	53	780
Shale, blue .....	15	795
Limestone, gray .....	250	1045
Sandstone, gray (Show of oil 1,055 to 1,060.) .....	15	1060
Shale, green, blue .....	270	1330



AN OLD MOUNTAIN HOME

This old weather-boarded double log cabin with its closed-in porch and exterior stone chimneys is reminiscent of a day that is passing in Kentucky. With their low paling fences, old homes such as this one, which is located near Folger, breathe a flavor of the old Virginia plantations from whence their builders came.

Strata	Thickness	Depth
<b>DEVONIAN SYSTEM</b>		
Shale, brown (Gas in shale, 1,400 to 1,410)	185	1515
Shale "Fire Clay," gray .....	10	1525
Shale, black .....	16	1541
Limestone "Irvine Sand," gray (Gas in sand 1,580 to 1,585.) .....	85	1625
Total depth .....		1626

All sands above lime carried more or less water. Corniferous was nearly all lime and very hard excepting between 1,580 and 1,585 feet it was of a sandy nature, and carried a small amount of gas.

## WELL LOG No. 12.

Lizzie Sharp No. 1, lessor. Standard Oil Co. of Kentucky, lessee. Location: Near mouth of Big Wild Cat Creek on Goose Creek, about 9 miles from Manchester and 4 miles from Oneida, Ky. Production: Small gasser, plugged and abandoned. Drilled by H. O. Randel, contractor. Completed: June, 1925.

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Soil .....	10	10
Sand, loose, brown, soft (H. F. W.) .....	10	20
Mud, blue soft (67' 4" 10" Cas.) .....	47	67

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, hard white .....	83	150
Shale, blue .....	60	210
Sandstone, white .....	94	304
Shale, black .....	6	310
Sandstone, white .....	121	431
Shale, black .....	24	455
Limestone, black .....	10	465
Sandstone, white (Salt water) .....	105	570
Shale, black .....	5	575
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, black (Some gas.) .....	45	620
Shale, red .....	50	670
Shale, blue .....	50	720
Limestone, "Little Lime" .....	20	740
Shale, blue .....	48	788
Limestone, gray, "Big Lime" (798' 8" Cas.) .....	222	1010
Shale, green (S. L. M.) .....	25	1035
Shale, red .....	55	1090
Shale, blue and green .....	222	1312
<b>DEVONIAN SYSTEM</b>		
Shale, brown .....	148	1460
Shale, gray .....	37	1497
Limestone, sandy, gray (Irvine Sand) .....	81	1578
Shale, blue .....	21	1599
Total depth .....		1599

Note: Small gas in Big Lime from 1,000' to 1,010'. Estimated fifteen thousand feet. Small gas in Irvine Sand from 1,537 to 1,542'. Estimated total gas in well 20 thousand cu. ft. Authority: J. C. Hall, Standard Oil Co., Louisville, Ky.

#### WELL LOG No. 13.

Elisha Gabbard No. 1, lessor. National Refining Co., lessee. Location: Mouth of Bar Creek on the waters of Red Bird Creek, Clay County, Ky. Commenced: July, 1925. Completed: Sept. 25, 1925. Production: Natural gas, about 500,000 cu. ft., open flow. Rock pressure 300 lbs. Contractor: H. O. Randel.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil, yellow .....	12	12
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone, gray .....	20	32
Shale, blue .....	93	125
Coal, black .....	2	127

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, blue .....	48	175
Sandstone, gray .....	115	290
Shale, blue .....	15	305
Sandstone, gray .....	216	521
Coal .....	2	523
Shale, blue .....	10	533
Sandstone, gray .....	127	660
MISSISSIPPIAN SYSTEM		
Limestone, blue .....	40	700
Shale, red .....	15	715
Limestone, blue .....	10	725
Shale, red .....	5	730
Limestone, blue .....	9	739
Shale, red .....	7	746
Limestone, black .....	12	758
Shale, red .....	4	762
Limestone, black .....	38	800
Shale, red .....	15	815
Limestone, black .....	22	837
Shale, blue .....	5	842
Limestone, black .....	47	895
Shale, blue .....	6	901
Limestone, gray .....	17	918
Shale, blue .....	5	923
Limestone, blue .....	272	1195
Shale, green .....	9	1204
Shale, red .....	61	1265
Shale, blue .....	172	1437
Limestone, gray .....	7	1444
Shale, gray .....	35	1479
DEVONIAN SYSTEM		
Shale, brown .....	154	1633
Shale, gray .....	5	1638
Shale, black .....	15	1653
Limestone, "Gas Sand," brown .....	10	1663
Limestone, "Gas Sand," gray .....	10	1673
Limestone, blue (cave at bottom).....	44	1717
Total depth .....		1717

Note: 10" casing 120'; 8¼" casing, 530'; 6½" casing, 945 ft.  
 Note change in material, character, etc. of each formation.

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Revised July, 1926.







## VIII.

### NEW OIL AND GAS POOLS OF OWSLEY COUNTY.

#### BUFFALO CREEK POOL.

Within the last two years a number of producing oil wells have been drilled in Southern Owsley County, particularly on the waters of Buffalo Creek which is about 15 miles in an air line west of Chavies, a station on the Louisville and Nashville



HENRY OIL CO. LEASE, WELLS NO. 1 AND NO. 4.

Railroad. The Buffalo Creek region is located in the western central part of the Eastern Kentucky Coal Field. The drainage is to the south fork of the Kentucky River, and is typically dendritic. The physical relief varies from 400 to 600 feet as shown on the Manchester topographic quadrangle. Entrenchment of the streams in this part of the Cumberland plateau is very pronounced. Only sandstones, shales and coals of Pottsville age (Lower Pennsylvanian) are found at the surface. These rocks have a subsurface thickness of about 850 to 900 feet in this vicinity, thereby giving a total upper Carboniferous section of

1,250 to 1,500 feet. They are underlaid by undisturbed limestones, sandstones and shales not less than 3,500 or 4,000 feet in thickness of Mississippian, Devonian, Silurian, and Ordovician age.



TANKING PRODUCTION HENRY OIL CO. NO. 1 WELL.

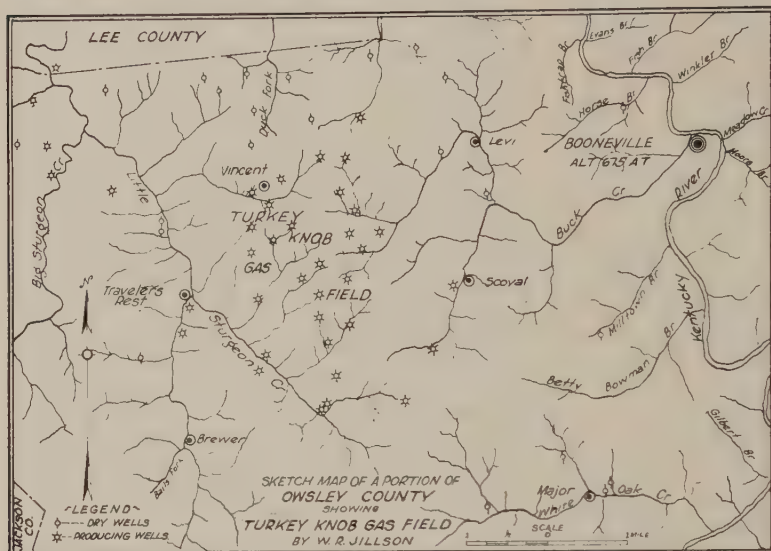
The first commercial oil production in the Buffalo Creek territory was brought in by the Henry Oil Co. which drilled in its first producer on September 19, 1924. This well produced when flush an estimated 20 to 25 barrels per day from the Gasper oolitic limestone (Chester) at a total depth of 1,111 feet. The samples of the "sand" from the oil producing horizon were examined under the microscope and identified by the writer. The oil production of this section, therefore, comes from the upper part of what is known to drillers as the "Big Lime" (Upper Mississippian).

This portion of Owsley County is the only section in Kentucky where commercial quantities of oil are now being produced from the Gasper limestone, though oil shows have been found in the Big Lime in Martin County whereas in the Williamsburg, Ky. field, it has long produced gas in large quantities. Near

Bowling Green the Gasper limestone is found oil-saturated in quarries. At the present time these Buffalo Creek wells are estimated to be producing about 8 to 10 barrels per day when pumped continuously. The depth to the top of the oil "sand" in No. 1 is 1,107 feet, while in No. 2 it is 1,104 feet. Their casing head elevations are respectively 818.0 and 815.5 feet above sea level. Henry Oil Co. No. 3 well is 816.9 feet above sea level.

The discovery well in the Gasper "sand" drilled by the Henry Oil Co. was the third to be drilled in this immediate region, two others, one a small producer and the other giving only an oil show, having been drilled several years previously  $1\frac{1}{2}$  to one mile up stream. One of these wells drilled by the Buffalo Creek Oil and Gas Co. of Parkersburg in 1921 may be seen just below Billy Branch. The other was drilled in 1922 just above Lick Branch. In addition to these wells another dry hole (depth 1,320 feet) had been drilled about five miles below this group of drillings on the waters of Buffalo Creek just below the mouth of Roans Branch in 1918.

On January 25, 1925 the Henry Oil Co. commenced drilling No. 2 well and completed it as a commercial oil well March 11, 1925. This organization has recently brought in its No. 3 well which is also a producer of commercial importance. During the same period the Superior Oil Co., C. B. Gross, and the Standard Oil Co. of Kentucky have each drilled in wells at points within a mile to a mile and a half down stream. The first and last of these recent drillings were dry, while the Gross well cased and tubed shows a small amount of oil, and can be made a small commercial producer. Logs of these drillings together with the Henry Oil Co. logs and a few others scattered throughout Owsley County are presented herewith for comparative purposes.



## WELL LOG No. 1.

## OWSLEY COUNTY

Thos. Forman Co., No. 1, lessor. Henry Oil Co., No. 1, lessee. Location: Buffalo Creek, South Fork of Ky. River, just below Old House Creek, and near Mistletoe P. O., Owsley County, Ky. Commenced: May, 1924. Completed: Sept. 19, 1924. Production: Estimate of 20 bbls. from Big Lime. 1107-1111 feet in depth. C. H. E. 818.0 A. T.

Strata	Thickness	Depth
RECENT		
Creek sand and gravel .....	14	14
PENNSYLVANIAN SYSTEM		
Sandstone .....	12	26
Shale and coal .....	4	30
Shale .....	46	76
Sandstone .....	8	84
Sandstone and shale .....	46	130
Sandstone .....	25	155
Shale .....	20	175
Shale, sandy .....	38	213
Shale .....	25	238
Shale, sandy .....	15	253
Sandstone .....	12	265
Shale .....	25	290
Shale, sandy .....	10	300
Shale .....	25	325

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, hard .....	50	375
Shale and sand .....	10	385
Sandstone .....	55	440
Sandstone and shale .....	5	445
Shale .....	20	465
Shale, black .....	5	470
Sandstone, fine white .....	5	475
Shale and dark sand .....	10	485
Sandstone, fine, white .....	10	495
Shale, sandy and coarse white sandstone...	10	505
Sandstone, white, medium coarse .....	42	547
Sandstone, light bluish micaceous .....	35	582
Sandstone, fine, ferruginous .....	20	602
Shale, dark blue to black .....	8	610
Sandstone, fine white .....	22	632
Sandstone, fine with streaks of shale.....	12	644
Sandstone, fine white .....	37	681
Sandstone, yellow and dark shale .....	5	686
Sandstone, fine brown .....	6	692
Sandstone, fine white .....	2	694
Shale, brown, sandy .....	5	699
Shale, light blue .....	39	738
Sandstone, fine white .....	9	747
Sandstone, yellow, brown ferruginous.....	8	755
Shale, light blue .....	5	760
Sandstone, coarse .....	5	765
Sandstone, fine white .....	45	810
Sandstone, fine brown "Salt Sand" .....	64	874
Shale, sandy, limey .....	58	932
Sandstone, fine brown .....	34	966
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, light blue, limey .....	130	1096
Limestone, shaly brown .....	11	1107
Limestone, light brown, open textured (oil)	11	1118
Total depth .....		1118

Note:—Cased at 253 feet.

#### WELL LOG No. 2.

Thomas Forman Co., No. 2, lessor. Henry Oil Co., No. 2, lessee.  
 Location: Upper Buffalo Creek, South Fork of Kentucky River, near  
 Mistletoe P. O., Owsley County, Ky. Commenced: Jan. 15, 1925. Com-  
 pleted: Mar. 11th, 1925. Production: First 24 hours after shot 42.8  
 bbls. by gauge. C. H. E. 815.5 A. T.



Strata	Thickness	Depth
RECENT		

Creek sand and gravel .....	11	11
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## PENNSYLVANIAN SYSTEM

Sandstone .....	14	25
Shale .....	50	75
Sandstone .....	75	150
Shale .....	20	170
Shale, sandy .....	35	205
Shale—cased 8¼" casing at 233 .....	40	245
Sandstone .....	15	260
Shale—water and gas at 320—hole full of water .....	60	320
Shale .....	60	380
Sandstone .....	55	435
Shale .....	35	470
Sandstone, white .....	130	600
Shale .....	10	610
Sandstone .....	80	690
Shale, sandy .....	45	735
Sandstone, white .....	20	755
Shale .....	30	785
Sandstone .....	55	840
Shale, sandy .....	5	845
Shale, black .....	34	879
Shale, muddy .....	11	890
Shale .....	28	918
Sandstone, white "Salt Sand" .....	35	953
Shale, blue—cased at 956 6½" casing .....	3	956
Shale .....	9	965

## MISSISSIPPIAN SYSTEM

Shale, limey .....	15	980
Shale .....	85	1065
Limestone, black .....	24	1089
Limestone, sandy, brown, hard, cap, Gasper limestone .....	11	1100
Limestone, brown, sandy, pay sand, Gasper limestone .....	15	1115
Oil filled over tools at 1102.		
Total depth .....		1115

Shot 40 quarts 2-4 in. shells.

## WELL LOG No. 3.

Thomas Forman Co., No. 3, lessor. Henry Oil Co., lessee. Location: Upper Buffalo Creek, near Mistletoe P. O., Owsley County, Ky. Commenced: May 1, 1925. Completed: June 20th, 1925. Authority: Frank Henry.

Strata	Thickness	Depth
RECENT		
Creek sand and gravel .....	15	15
PENNSYLVANIAN SYSTEM		
Sandstone, hard .....	15	30
Shale .....	50	80
Sandstone .....	75	155
Shale .....	20	175
Shale, sandy .....	35	210
Shale .....	40	250
Sandstone .....	15	265
Shale, water and gas .....	55	320
Shale .....	65	385
Sandstone .....	55	440
Shale .....	35	475
Sandstone .....	130	605
Shale .....	10	615
Sandstone .....	85	700
Shale, sandy .....	40	740
Sandstone, white .....	20	760
Shale .....	30	790
Sandstone .....	55	845
Shale, sandy .....	5	850
Shale, black .....	35	885
Shale, soft .....	10	895
Shale .....	25	920
Sandstone, white .....	20	940
Sandstone, white "Salt Sand" .....	20	960
Shale .....	2	962
Shale .....	23	985
MISSISSIPPIAN SYSTEM		
Shale, limey .....	65	1050
Shale, blue, cavey .....	16	1066
Limestone, black .....	29	1095
Limestone, brown, sandy—Cap .....	9	1104
Limestone, brown, sandy, best pay.....	14	1118
Limestone, brown, sandy .....	13	1131
Limestone, brown sandy .....	25	1156
Total depth .....		1156

Note:—8¼ casing at 233 feet. 6¼ casing at 962 feet.

Shot 40 qts. 2-4" shells. 1102-1118. 13 ft. anchor.

Drilled 28 feet under shot to make pocket for shale caving from 1060 feet.

#### WELL LOG No. 4.

Hogg heirs, No. 1, lessors. Standard Oil Co., lessee. Location: Head of Harrison Branch, Upper Buffalo Creek, Owsley County, Kentucky. Commenced: Oct. 12, 1925. Completed: Dec. 18, 1925. C. H. E. 1241.0 A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Clay, soft yellow .....	10	10
Sandstone, brown .....	15	25
Shale, gray .....	35	60
Shale, sandy blue gray .....	20	80
Shale, black .....	20	100
Sandstone, brown to medium black .....	25	125
Shale, soft blue .....	15	140
Coal, soft black .....	2	142
Shale, blue, soft .....	45	187
Shale, sandy soft blue .....	25	212
Shale, blue and black .....	50	262
Coal, black, soft .....	2	264
Sandstone, soft, white .....	57	321
Sandstone, hard, white .....	16	337
Shale, gray, shelly .....	59	396
Coal, soft black .....	2	398
Shale, sandy, blue, hard .....	82	480
Sandstone, brown, hard .....	30	510
Shale, black, hard .....	30	540
Limestone, black, hard .....	20	560
Sandstone, white, hard .....	14	574
Shale, black, hard .....	10	584
Sandstone, hard, white .....	53	637
Shale, hard, black .....	18	655
Limestone, hard, black .....	30	685
Shale, soft, black .....	85	770
Limestone, black, hard 250 ft., water 772....	20	790
Shale, soft blue .....	40	830
Sandstone, hard white .....	130	960
Limestone, sandy, brown to black.....	13	973
Coal, soft black .....	2	975
Sandstone, white, hard .....	70	1045
Shale, black, soft .....	2	1047
Limestone, sandy black, hard .....	23	1070

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, hard white .....	88	1158
Shale and blue mud, soft .....	5	1163
Limestone, black, hard .....	15	1178
Shale, sandy, hard, black.....	22	1200
Sandstone, white, very hard .....	124	1324
Shale, soft blue (mud) .....	1	1325
Sandstone, settling, black, very hard.....	4	1329
MISSISSIPPIAN SYSTEM		
Limestone, black, hard .....	12	1341
Shale, soft, black, sandy .....	35	1376
Limestone, sandy, gray-brown, hard .....	32	1408
Sandstone, white, very hard .....	16	1424
Shale, sandy, blue, soft .....	11	1435
Sandstone, "salt," white, 600 ft. salt water	15	1450
Shale, sandy, black, med.—cased 6½, 24 lb.	17	1467
Shale, sandy, blue, soft, casing at 1457.....	71	1538
Limestone, black, hard .....	29	1567
Limestone, gray, hard .....	15	1582
Limestone, brown, hard .....	8	1590
Continuation of above well commenced Jan. 1, 1926, completed Jan., 18.		
Limestone, sandy, brown, hard .....	32	1622
Limestone, white, hard .....	8	1630
Limestone, dark brown, hard .....	4	1634
Limestone, hard, brown .....	60	1694
Limestone, sandy, brown, hard .....	5	1699
Limestone, hard, brown .....	19	1718
Limestone, hard, light brown .....	10	1728
Limestone, sandy, brown,, hard .....	9	1737
Limestone, sandy, dark brown, hard.....	8	1745
Limestone, sandy, light brown, very hard..	15	1760
Limestone, sandy, light brown, very hard..	8	1768
Limestone, sandy, dark brown, very hard..	7	1775
Limestone, gray, very hard .....	4	1779
Limestone, sandy, dark gray, very hard....	4	1783
Limestone, shaley, dark gray, hard.....	4	1787
Limestone, sandy, light brown, soft, "pay sand" .....	5	1792
Shale, light blue?, soft .....	19	1811
Shale, dark blue, soft .....	4	1815
Total depth .....		1815

Well shot 20 qts. of glycerine between 1787-1795. Did not improve the showing.

Well was plugged Jan. 18, 1926.

Note:—This well would have made 4-5 bbls. in the "sand" 1787-1792.

#### WELL LOG No. 5.

Dean-Forman No. 1, lessor. Rex-Pyramid Oil Co., lessee. Location: Near mouth on waters of Old House Branch of Upper Buffalo Creek, Owsley, County, Ky. Commenced: Feb. 8, 1926. Completed: Mar. 20, 1926. Contractor: Frank Henry. C. H. E. 851.0 A. T.

Strata	Thickness	Depth
RECENT		
Soil .....	4	4
PENNSYLVANIAN SYSTEM		
Shale, sandy .....	14	18
Coal .....	1	19
Shale, sandy .....	41	60
Sandstone, white .....	12	72
Shale .....	18	90
Limestone, sandy .....	7	97
Shale, black .....	56	153
Sandstone, white .....	13	166
Shale, black .....	47	213
Sandstone, gray .....	20	233
Shale, black .....	36	269
Shale, black .....	42	311
Limestone, black .....	63	374
Shale, sandy .....	25	399
Shale, black .....	40	439
Shale, sandy .....	33	472
Sandstone, white .....	75	547
Shale, blue .....	3	550
Sandstone, blue .....	15	565
Sandstone, white .....	80	645
Coal .....	2	647
Sandstone, white .....	45	692
Coal .....	2	694
Limestone, black .....	9	703
Sandstone, brown, hard .....	75	778
Sandstone, white .....	15	793
Sandstone, white .....	68	861
Shale, blue .....	5	866
Limestone, black .....	18	884
Shale, "Red Rock," and soft .....	5	889
Shale .....	10	899

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Limestone, black .....	30	929
Limestone, shaley .....	4	933
Shale, green .....	5	938
Shale, brown .....	5	943
Sandstone, white "Salt Sand" .....	34	977
Shale, blue .....	10	987
Sandstone .....	5	992
Sandstone and shale .....	6	998
Shale, black .....	2	1000
Shale, black .....	11	1011
Shale, blue .....	30	1041
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, sandy .....	5	1046
Shale, blue, limey .....	30	1076
Limestone, black .....	34	1110
Limestone, brown, sandy "Cap" .....	12	1122
Limestone, brown, sandy, oil show .....	5	1127
Limestone, light brown .....	21	1148
Limestone, dark brown .....	13	1161
Total depth .....		1161

Note:—8¼" casing at 269 feet. 6½" casing at 998 feet. Show of gas at 495 feet. Show of oil 1122-1127 feet. Hole full of water at 793 feet.

#### WELL LOG No. 6.

Walter Gibson, No. 1, lessor. Eastern Gulf Oil Co., Lexington, Ky., lessee. Location: On waters of Bear Run of Cow Creek, Owsley County, Ky. Commenced: May 26, 1924. Completed: June 18, 1924. Contractor: C. E. Dearolph.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	5	5
<b>PENNSYLVANIAN SYSTEM</b>		
Shale .....	10	15
Shale, shelly, water .....	20	35
Coal .....	2	37
Limestone .....	3	40
Shale .....	20	60
Limestone, broken .....	90	150
Limestone, hard .....	5	155
Limestone, broken .....	55	210
Sandstone .....	60	270
Shale .....	50	320



Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Limestone, white .....	20	340
Limestone and shale, broken .....	10	350
Sandstone, sharp .....	205	555
Shale, black .....	65	620
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone—casing point, 6¼ in. ....	5	625
Shale, black .....	35	660
Limestone, "Big Lime," hard .....	140	800
Shale and shells .....	90	890
Shale, red .....	20	910
Shale .....	310	1220
<b>DEVONIAN SYSTEM</b>		
Shale, brown "Chattanooga" .....	190	1410
Shale, "Fire Clay" .....	2	1412
Shale .....	18	1430
Limestone, brown "sand" Cornif. light show of oil .....	11	1441
Limestone, brown, "sand" .....	8	1448
Limestone, "Corniferous" .....	64	1512
Limestone, "Sand," "Corniferous" .....	3	1515
Total depth .....		1515

Show of oil, salt water 250 ft., filled up 500 feet. 30 minutes—filled up 1,250 ft. 2 hours. Plugged and abandoned. 8¼" casing 20 feet. 6¼" casing 625 feet.

#### WELL LOG No. 7.

Burns-Forman, No. 1, lessors. C. B. Gross, et al., lessees. Location: Buffalo Creek, near Henry Wells, Owsley County, Ky. Commenced: June 22, 1925. Completed: Oct. 31, 1925. C. H. E. 879.0 A. T.

Strata	Thickness	Depth
<b>RECENT</b>		
Surface soil .....	28	28
<b>PENNSYLVANIAN SYSTEM</b>		
Sandstone .....	38	66
Coal .....	4	70
Shale, blue .....	34	104
Sandstone, shelly .....	12	116
Shale, white, limey .....	57	173
Sandstone .....	10	183
Shale, white .....	20	203
Sandstone .....	21	224
Shale, blue .....	40	264
Sandstone .....	10	274

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, blue .....	46	320
Sandstone .....	25	345
Shale, blue—cased 8¼—400 ft. ....	66	411
Shale, white .....	129	540
Sandstone .....	20	560
Shale, blue .....	30	590
Sandstone, "Mountain Sand" .....	60	650
Shale, blue .....	20	670
Sandstone, "Salt sand" .....	85	755
Shale, black .....	35	790
Sandstone, "Salt sand" .....	125	915
MISSISSIPPIAN SYSTEM		
Limestone, sandy .....	10	925
Shale, blue .....	25	950
Limestone, black .....	40	990
Limestone, white, sandy .....	30	1020
Limestone, white, sandy, with water.....	15	1035
Shale, limy .....	15	1050
Limestone, hard .....	18	1068
Shale, blue .....	12	1080
Limestone, black .....	5	1085
Limestone, broken .....	35	1120
Shale, black, "Pencil Cave," cased 1127½..	7	1127
Limestone, black—Cap of "Big Lime".....	25½	1152½
Limestone, "Big Lime"—1st pay oil.....	15½	1168
Limestone,—pay sand .....	7	1175
Limestone, gray—top of 2nd pay sand.....	15	1190
Limestone, gray—2nd pay sand .....	9	1199
Limestone, gray and shale .....	3	1202
Total depth .....		1202

## WELL LOG No. 8.

Location: Below Roans Branch of Buffalo Creek, near Clay-Owsley County line. One-half mile from Creek on North Side. Completed in 1918.

Strata	Thickness	Depth
RECENT.		
Clay .....	5	5
PENNSYLVANIAN SYSTEM		
Shale .....	21	26
Sandstone .....	44	70
Shale .....	30	100
Shale, shelly .....	110	210

Strata	Thickness	Depth	
PENNSYLVANIAN SYSTEM			
Sandstone .....	240	450	
Shale .....	25	475	
MISSISSIPPIAN SYSTEM.			
Limestone, "Little Lime" .....	15	490	
Shale .....	10	500	
Limestone, "Big Lime" .....	120	620	
Shale .....	10	630	
Limestone .....	25	655	
Sandstone .....	15	670	
Shale, white, shelly .....	170	840	
Shale, dark, shelly .....	280	1120	
DEVONIAN SYSTEM			
Shale, black	"Chattanooga" {	163	1283
Shale, white		3	1286
Shale, brown		23	1309
Limestone .....		8	1317
Limestone "Sand" .....		3	1320
Total depth .....			1320

Note: Oil pay was struck at 1,317 feet in depth. This record revised from p. 471 Oil and Gas Resources of Kentucky. Ky. Geol. Survey, Bull. 1, Ser. V, 1920.

#### WELL LOG No. 9.

Brandenberg, lessor. Petroleum Exploration, Lessee. Location: On waters of Wild Dog Creek, about  $\frac{1}{2}$  mile west of the mouth of Wild Dog Creek, Owsley Co., Ky. Drilled by Hupp, Heidrick, et al. Commenced: 1923. Completed: 1923.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone .....	800	800
Sandstone, "gas sand" .....	12	812
Limestone, blue--oil show, water .....	28	840
Total depth .....		840

Filled back and led plug set to shut off salt water.

This well had some big hole gas above the limestone which still show up outside the casing.

It is said that this well tested about 1,000,000 cu. ft.

The Rex Oil Co. have a gas well about two miles south of this well on the Joe Tackett farm; also two wells on the Venable farm, about two miles southeast. The Venable wells tested around 2,000,000 cu. ft. each, while the Tackett well only showed about 150,000 feet.

## WELL LOG No. 10.

J. B. Gathright Land Co., lessor. D. L. Johnson, lessee. Location: On waters of Sturgeon Creek, Owsley County, Ky. Commenced: Completed: July 8th, 1925.

Strata	Thickness	Depth
RECENT		
Soil .....	10	10
PENNSYLVANIAN SYSTEM		
Sandstone, black shale .....	379	389
Limestone, "Big Lime" .....	120	509
Shale, green, hard, sandy .....	71	580
Shale, "Soapstone" .....	364	944
Shale, black, "Chattanooga" .....	126	1070
Shale, "Fire Clay" .....	12	1082
Shale, coffee, "Sunbury" .....	8	1090
Limestone, white, hard, "Cap" .....	7	1097
Sandstone, "Gas Sand," very open .....	8	1105
Total depth .....		1105

Open flow tested at 1097, 1,861,000 cu. ft. Open flow tested at 1105, 2,151,080 cu. ft. Rock pressure 325 lbs. 407 feet, 6% 17 lbs. casing.

Tubing Record:—6% special type oil well packer. 18 in. rubber set at 1090. Gas cage set at 1102. Anchor 3 feet below cage. 1800 test line pipe used for tubing, new. 2" Darlington high pressure gate valve. 300 feet of water run outside of tubing, shut off completely.

Drillers:—Chas. Morgan and Chas. Hanlin. Tool dressers: Everett Morgan and Hayden Arthur.

## LOG WELL No. 11.

J. S. Burns, No. 1, lessor. Superior Oil Corporation, lessee. Location: 150' N. E. of Creek, 150' from S. line of J. S. Burns which is N. line of Morris farm, Owsley County, Ky. Commenced: July 30, 1925. Completed: Jan. 5, 1926.

Strata	Thickness	Depth
RECENT		
Soil .....	20	20
PENNSYLVANIAN SYSTEM		
Shale, sandy .....	25	45
Sandstone, white .....	15	60
Coal .....	5	65
Limestone, gray .....	20	85
Coal .....	3	88
Shale, sandy .....	17	105
Sandstone, white .....	35	140
Shale, blue .....	15	155
Shale, hard, sandy .....	125	280

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, black .....	30	310
Shale, hard, sandy .....	70	380
Shale, shelly—set 445' 8" pipe .....	65	445
Sandstone, white .....	65	510
Shale, blue .....	75	585
Shale, sandy .....	110	695
Shale, blue .....	5	700
Sandstone, white .....	129	829
Shale, green .....	2	831
Shale, sandy .....	14	845
Shale, blue .....	15	860
Shale, sandy .....	60	920
Shale, blue .....	20	940
Shale, black, very hard .....	3	943
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, blue .....	17	960
Limestone, dark .....	10	970
Limestone, shelly .....	45	1015
Shale, dark .....	15	1030
Limestone, black, set 1044', 6¼ casing .....	28	1058
Sandstone, light—"pay sand" .....	9	1074
Sandstone, dark—show of oil .....		
Sandstone, light .....	12	1086
Sandstone, dark .....	23	1109
Shale .....	5	1114
Sandstone, light .....	16	1130
Shale .....	4	1134
Limestone, dark .....	9	1143
Limestone, white .....	7	1150
Limestone, dark .....	8	1158
Limestone, dark .....	82	1240
Shale, blue, "New Providence" .....	350	1590
<b>DEVONIAN SYSTEM</b>		
Shale, black ...	211	1801
Shale, green ...	10	1811
Shale, black ...	6	1817
Limestone, dark gray ...	11	1828
Limestone, white ...	1	1829
Limestone, black ...	7	1836
Limestone, gray ...	12	1848
Limestone, black ...	15	1863
Limestone, gray ...	3	1866
<b>SILURIAN SYSTEM</b>		
Limestone, black .....	34	1900

Strata	Thickness	Depth
<b>SILURIAN SYSTEM</b>		
Limestone, gray .....	35	1935
Shale, green .....	7	1942
Total depth .....		1942

## WELL LOG No. 12.

T. W. Cooper, No. 1, lessor. Eastern Gulf Co., lessee. Location: 1,000 feet N. E. of school house at mouth of Moore Fork and Tinney Fork of Lower Buffalo Creek and 1,500 feet E. of county road. Commenced: July 1, 1918. Completed: Aug. 21, 1918. Production: Small oil and gas shows, plugged and abandoned. Armes Drilling Co., contractors.

Strata	Thickness	Depth
<b>RECENT</b>		
Soil .....	5	5
<b>PENNSYLVANIAN SYSTEM</b>		
Shale .....	13	18
Coal .....	1½	19½
Shale, shelly .....	70½	90
Coal .....	4	94
Shale, shelly .....	116	210
Sandstone, gas, water .....	15	225
Sandstone .....	75	300
Shale, break .....	10	310
Sandstone, shelly .....	70	380
Shale .....	20	400
<b>MISSISSIPPIAN SYSTEM</b>		
Shale, shelly .....	90	490
Limestone, "Big Lime" .....	10	500
Limestone, "Big Lime" .....	155	655
Shale .....	20	675
Shale, shelly .....	70	745
Shale, shelly .....	60	805
Shale, "Red Rock" .....	5	810
Shale, shelly .....	80	890
Shale, black .....	30	920
Shale, shelly .....	180	1100
Shale .....	2	1102
<b>DEVONIAN SYSTEM</b>		
Shale, brown .....	33	1135
Shale, white.... } "Chattanooga" { .....	167	1302
Shale, black } .....	26	1328
Limestone, "Top oil sand" .....		1328
Limestone "Salt water" .....	10	1338



Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone .....	10	1348
Limestone .....	10	1358
Limestone, white .....	10	1368
Limestone, brown .....	10	1378
Limestone, dark brown .....	10	1388
Limestone, gray .....	35½	1423½
Total depth .....		1423½

Note:—Last casing was set at 1358, and upper casing as follows: 8¼ casing 47 feet out. 6¼ casing 500 feet out. 4⅞ casing 1349 feet out. Oil at 1330 feet.

This record revised from pp. 471-472 of "Oil and Gas Resources of Ky.," Bul. 1, Series 5, Ky. Geol. Survey, 1920.

#### WELL LOG No. 13.

Chester Gourlay, lessor. Petroleum Exploration, lessee. Location: On waters of Sturgeon Creek ½ mile east of the mouth of Wild Dog Creek, on top of hill. Commenced: ————. Completed: May 16, 1924. Drilled and owned by the Petroleum Exploration of Sistersville, W. Va.

Strata	Thickness	Depth
PENNSYLVANIA SYSTEM		
Soil .....	12	12
Shale, sandstone, shells .....	328	440
MISSISSIPPIAN SYSTEM		
Limestone, "Big Lime" .....	130	570
Shale, blue, soapstone .....	454	1024
DEVONIAN SYSTEM		
Shale, black, "Chattanooga" .....	120	1144
Shale, "Fire Clay" .....	6	1150
Shale, dark .....	4	1154
Sandstone .....	6	1160
Sandstone, "gas sand" .....	12	1172
Limestone, blue .....	12	1184
Total depth .....		1184

Gas tested after completion 1,300,000 cu. ft. Rock pressure 240 lbs. 570 feet 6⅝ casing.

#### WELL LOG No. 14.

S. W. Maupin, No. 1, lessor. ————, lessee. Location: Doe Creek, 4 miles S. W. of Booneville, Owsley County, Ky. Authority: O. L. Knight, through C. H. Hopping.

Strata	Thickness	Depth
RECENT		
Soil, 10 in. casing .....	10	10
PENNSYLVANIAN SYSTEM		
Shale .....	335	345
Sandstone .....	315	660
MISSISSIPPIAN SYSTEM		
Limestone, "Little Lime" .....	10	670
Shale .....	30	700
Limestone "Big Lime" .....	118	818
Sandstone, "Big Injun," oil 860-866.....	82	900
Total depth .....		900

Note:—Set  $8\frac{1}{4}$  casing 123 feet. Set  $6\frac{1}{4}$  casing 693 feet.

#### WELL LOG No. 15.

Bowen Pendergrass, Well No. 1, lessor. Davis Oil Co., lessee.  
Location: Waters of White Oak Creek, of south fork of Kentucky River, near Major P. O.,  $4\frac{1}{2}$  miles south of Booneville, Owsley County, Ky. Commenced: ———. Completed: ———.

Strata	Thickness	Depth
RECENT		
Soil .....	20	20
PENNSYLVANIAN SYSTEM		
Shale and shells .....	60	80
Shale, soft caving .....	10	90
Sandstone .....	110	200
Shale .....	190	390
Shale .....	35	425
Sandstone .....	35	460
Shale, white .....	15	475
MISSISSIPPIAN SYSTEM		
Shale, "Pencil Cave" .....	15	490
Limestone, "Big Lime" .....	180	670
Total depth .....		670

Note:—Gas was found in the "Big "Lime" at 535 feet. Show of gas 625-630 ft; oil and gas 660-662; 662-664 is reported to have shown oolites and may have been the Cooper limestone (Chester) but this seems hardly probable as it is apparently too low in the limestone series.

#### WELL LOG No. 16.

Well drilled for oil and gas. Location:  $2\frac{1}{2}$  miles N. W. of Booneville, Owsley County. Commenced: ———. Completed: ———  
Production: Reputed to be 35 bbls. oil.

Strata	Thickness	Depth
RECENT		
Soil .....	5	5
PENNSYLVANIAN SYSTEM		
Sandstone, hard, gray .....	7	12
Shale and shells .....	5	17
Coal .....	3	20
Shale, gray .....	35	55
Coal .....	2	57
Shale, blue .....	43	100
Coal and gas .....	3	103
Shale, blue .....	37	140
Sandstone .....	10	150
Shale, blue .....	8	158
Coal .....	4	164
Sandstone, white .....	25	187
Shale, black .....	28	215
Sandstone, white .....	40	255
Sandstone, gray, white .....	40	295
Shale, black, water .....	10	305
Sandstone, gray .....	20	325
Sandstone, white .....	120	445
Shale, "Fire Clay" .....	5	450
Shale, gray .....	15	465
MISSISSIPPIAN SYSTEM		
Limestone, gray, "Little Lime" .....	34	499
Shale, dark .....	13	502
Limestone, "Big Lime" .....	130	632
Shale, green .....	12	644
Shale, "Red Rock" .....	22	666
Shale, green .....	9	675
Shale, "Red Rock" .....	72	747
Shale, green .....	35	782
Limestone, shelly .....	17	799
Shale, gray .....	306	1105
DEVONIAN SYSTEM		
Shale, brown, "Chattanooga" .....	146	1251
Shale, soft, "Fire Clay" .....	18	1260
Shale, brown .....	5	1274
Limestone, "pay sand" { "Corniferous" } .....	7	1290
Limestone { "Corniferous" } .....	9	1283
Limestone .....	11	1301
Total depth .....		1301
Note:—Set casing at 474 feet.		

## LOG No. 17.

John G. White Oil & Gas Co., No. 1. Location: On Meadow Creek.  
Commenced: Feb. 10, 1909. Completed: April 12, 1909. Production:  
Dry hole. Authority: C. E. Bales.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil .....	8	8
Shale .....	60	68
Sandstone .....	32	100
Shale, blue .....	100	200
Sandstone .....	175	375
Shale, blue .....	50	425
Sandstone (salt water) .....	193	618
Shale .....	6	624
MISSISSIPPIAN SYSTEM		
Limestone (Little Lime) .....	8	632
Shale, blue .....	20	652
Limestone (Big Lime) .....	184	836
Shale (Waverly) .....	438	1274
DEVONIAN SYSTEM		
Shale, brown (Chattanooga) .....	173	1447
Shale (fire clay) .....	15	1462
Shale, brown .....	10	1472
Limestone (Corniferous) .....	31	1503
Total depth .....		1503

## WELL LOG No. 18.

Rufus Barker, No. 1, lessor. Location: At Traveler's Rest P. O.  
Production: No oil, gas under cap.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sand (Mountain) .....	469	469
MISSISSIPPIAN SYSTEM		
Limestone (Big Lime) .....	101	570
Limestone, white .....	14	584
Shale, green (Waverly) .....	398	982
DEVONIAN SYSTEM		
Shale, blue, Chattanooga .....	130	1112
Shale, black, Chattanooga .....	16	1128
Fire clay .....	4	1132
Limestone "sand," (gas) .....	20	1152
Shale, black .....	15	1167

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone "sand" .....	34	1201
Shale, blue .....	1	1202
Total depth .....		1202
Casing record: 32 ft. 8¼ in. casing; 584 ft. 6¼ in. casing.		

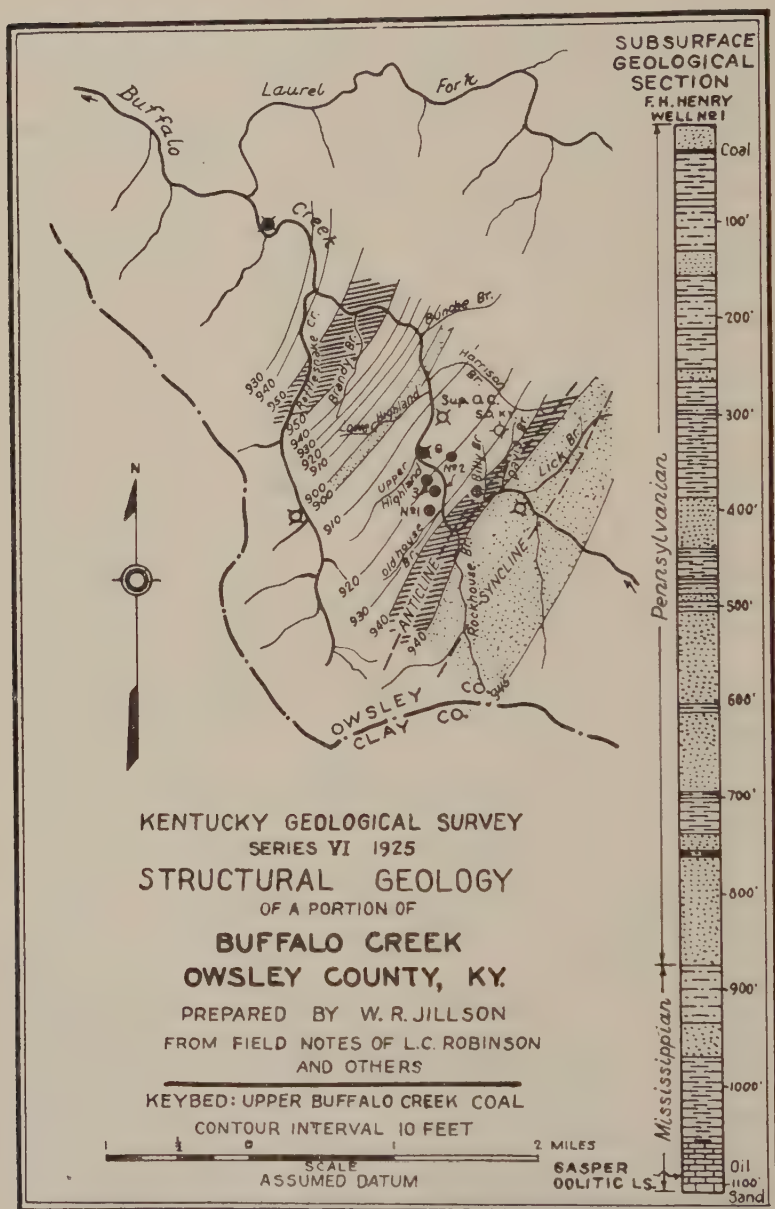
## WELL LOG No. 19.

Dean Heirs No. 1, Lessor. Rex-Pyramid and Henry Co., Lessees.  
Location: 1½ miles up Rattlesnake Branch of Upper Buffalo Creek,  
Owsley County, Ky. Incompleted record. Driller, Frank Henry, Frank-  
fort, Ky.

Strata	Thickness	Depth
RECENT		
Soil and gravel .....	9	9
PENNSYLVANIAN SYSTEM		
Coal .....	1	10
Limestone, sandy, gray-hole full fresh water	22	32
Limestone, black .....	55	87
Shale, blue and mud .....	78	165
Shale, sandy, blue .....	30	195
Shale, black—cased 8¼" at 205'.....	35	230
Shale, brown, sandy, show of gas.....	1	231
Shale, black .....	10	241
Sandstone, hard, gray .....	9	250
Shale, sandy—gas at 380 ft.....	140	390
Limestone, black .....	8	398
Shale, blue, hard .....	87	485
Shale, black .....	20	505
Sandstone, gray—250 ft. fresh water at 510 ft. ....	17	522
Shale, light blue .....	23	545
Shale, sandy .....	15	560
Sandstone, hard .....	8	568
Limestone, black .....	7	575
Sandstone .....	35	610
Shale, sandy, black .....	52	662
Sandstone, white .....	87	749
Coal .....	1	750
Shale, sandy, black, hard .....	27	777
Shale, sandy, gray, hard .....	6	783
Shale, black and mud .....	5	788
Shale, black, hard .....	15	803
Sandstone, white, hard .....	134	937
Shale .....	10	947
Limestone, broken .....	10	957

Strata	Thickness	Depth
<b>PENNSYLVANIAN SYSTEM</b>		
Shale, red and mud .....	6	963
Limestone, black, very hard .....	4	967
Shale, and mud .....	13	980
Sandstone, white .....	55	1035
Sandstone, "Salt Sand" .....	10	1045
Sandstone, blue .....	10	1055
Shale, and mud—Cased 6 $\frac{5}{8}$ " casing at 1057'	2	1057
<b>MISSISSIPPIAN SYSTEM</b>		
Limestone, black .....	9	1066
Shale, limey .....	4	1070
Shale, black .....	9	1079
Limestone, sandy, gray .....	15	1094
Shale, black .....	17	1111
Limestone, black .....	34	1145
Limestone, brown, sandy, very hard—show of oil at 1160. Should have gotten the Buffalo sand here .....	41	1186
Shale, pea green, and pyrites.....	10	1196
Limestone, brown .....	10	1206
Limestone, gray .....	7	1213
Limestone, brown, dark.....	15	1228
Limestone, light brown .....	30	1258
Limestone, dark brown .....	20	1278
Limestone, light brown.....	15	1293
Limestone, dark brown .....	53	1346
Limestone, very dark brown .....	14	1360
Limestone, sandy, dark brown—good show of gas ("Big Injun Sand"?) .....	10	1370
Shale, blue .....	12	1382
Shale, blue and Red Rock .....	15	1397
Shale, blue .....	45	1442
Shale, blue and Red Rock .....	15	1457
Shale, blue—"New Providence" .....	228	1685
<b>DEVONIAN SYSTEM</b>		
Shale, black—"Chattanooga" .....	150	1835
Fire clay .....	8	1843
Shale, black .....	27	1870
Limestone, sandy, brown.....	15	1885
Limestone, dark gray .....	18	1903
Limestone, sandy, dark brown .....	5	1908
Sandstone, dark brown (sharp)—gas at 1908	22	1930
Sandstone, light brown .....	7	1937.
Limestone, dark brown .....	23	1960
Limestone, sandy, gray .....	2	1962
Still drilling Nov. 15, 1926.		





SKETCH MAP OF BUFFALO CREEK POOL STRUCTURE.

## STRUCTURAL GEOLOGY

The structural geology of Owsley County as a unit has not been mapped, but enough information is available from the detailed structural maps of Perry, Breathitt and Leslie counties which adjoin Owsley County on the East to indicate beyond doubt that the county occupies a low regional position on the Eastern flank of the Cincinnati arch. It is a distinct probability that the southern tip of Owsley County actually reaches down to within about a mile of the axis of the Eastern Kentucky Geosyncline as mapped on the surface coals in Western Perry County from the vicinity of Buckhorn south and slightly west of the Middle Fork of the Kentucky River.

This great syncline passes southeastward out of Perry County over the headwaters of Leatherwood Creek into Clay County near Burger Knob (1,750 feet)—the ridge point where Clay, Leslie and Perry corner. A study of the well logs in adjoining portions of Clay, Owsley and Perry counties indicates that the mediumly deep subsurface structure of the Buffalo Creek region is probably nearly monoclinal. The uninterrupted dip of deep strata to the southeast is brought about by the progressive thickening in this direction of the subsurface coal measures, principally the sandstones and shales, members of the Lee formation.

As interpreted from elevations placed by plane table methods on surface coals, chiefly that coal known locally as the upper Buffalo Creek seam, the structure in the immediate vicinity of the productive Henry wells is a low figuring anticlinal terrace, the reversal dip to the northwest being about 40 feet. Immediately southeast or upstream from these wells a low and broad syncline interrupts the rise of the surface measures to the Southeast. The dry well at the mouth of Lick Branch is located near the middle of this syncline, while the well which produced a small oil show near the mouth of Billy Branch is on the Southeast flank of the low anticline previously referenced. The productive Henry wells are located on the Northwest flank of this small structure.

The three wells drilled recently by C. B. Gross near the mouth of Upper Highland Creek, by the Superior Oil Corporation about  $\frac{3}{4}$  of a mile below it on Main Buffalo Creek, and

the Standard Oil Company of Kentucky on the head of Harrison Branch are all down structure from the Henry wells. The Gross and Superior wells are in fact not far above a local syncline which crosses lower Highland Creek and Buffalo Creek just below Harrison's Branch. The dry well just below Roans Branch is located about  $21\frac{1}{2}$  miles down stream from the point where this local syncline crosses. It is considerably northwest of the axis of the Rockcastle River uplift. This structure in its northeastward extension across the South Fork of the Kentucky River one mile below the mouth of Lower Teges Creek in Clay County, passes into Southern Owsley County and crosses Buffalo Creek at the mouth of Brandy Branch.

The structural figure of this uplift, so pronounced in Western Clay and Eastern Laurel counties on the headwaters of the Rockcastle River, is here in Owsley County nothing more than that of a low and inconspicuous fold plunging to the Northeast. It is thought that it may die out entirely before it reaches Laurel Fork of Buffalo Creek. A sketch map showing the surface structure of upper Buffalo Creek accompanies this report. A profile prepared to scale at the bottom of this map indicates at a glance the nature of the regional surface structure of this part of Owsley County.

The productive oil wells of the Henry Oil Co. are seen to be high on the northwest limb of a local anticline which itself is synclinal. This productive anticline is almost as low structurally as the Rockcastle River uplift which in this region is also synclinal. Furthermore it is interesting to note that this broad syncline between the headwaters and the mouth of Buffalo Creek is about 100 feet deeper than the Eastern Kentucky geo-syncline as mapped in Perry County south and west of Buckhorn. This structural depression must therefore be a closed or basin syncline—unusual, however, only because of its comparative depth and isolation.

#### PRODUCTION

Oil runs in the Buffalo Creek pool commencing in December, 1924, reached high points of 639 and 600 barrels respectively in March and September, 1925. Actual pipe line runs follow:

## PETROLEUM PRODUCTION

Buffalo Creek Pool, Owsley County, Kentucky.

1924	
December .....	186
1925	
January .....	325
February .....	247
March .....	639
April .....	336
May .....	397
June .....	559
July .....	322
August .....	499
September .....	600
October .....	382
November .....	552
December .....	550
Total .....	5044

## EXTENSION OF THE BUFFALO CREEK FIELD

Prior to the drilling of the wells on Buffalo Creek actual surface indications of oil were limited to an extremely small oil and gas seepage about two miles down Buffalo Creek from the Henry Oil Co. No. 2 well. This seep is no doubt associated with the axis of the Rockcastle River uplift which is a very important doming anticline in its western extension into Clay and Laurel counties. This pronounced structure is marked at several points throughout its course—notably Burning Springs, Clay County, by natural gas seeps of frequently considerable size. The occurrence of these natural gas seeps along this structure is suggestive of subsurface faulting whereby ease of access to the drainage level may have been provided for the various oil and gases.

Interpreting the surface structure as mapped areas productive of oil in commercial quantities as defined by the Henry Oil Company wells seem to be confined to the Northwest flank of a local fold in a basin syncline of possibly considerable size. Wells drilled a little farther up stream at the mouth of Billy Branch and Lick Branch in the broad and flat synclinal terrace which extends for two miles above the Henry wells and Rockhouse

Branch were unproductive. Based on structural features alone this fact invalidates the entire terrace as suitable productive drilling territory. Three wells drilled below the Henry wells from Upper Highland Branch to Harrison's Branch were unproductive, thereby condemning lower structural positions.

Evidently, therefore, unless other unknown factors such as irregular porosity enter into the problem, only a narrow elongate field following closely the 930 foot contour or Henry No. 1 well may logically be expected to produce. Variable extensions of the productive area of this field may possibly be made on Oldhouse Creek and on the middle waters of Billy Branch. Detailed information relative to the well drilled just below Roans Branch is lacking. If for any reason this was not a fair test, territory located on Brandy Branch of Rattlesnake Creek would become important from a prospecting standpoint and might produce. Carrying the logic of structure further, leases on the upper waters of Buffalo Creek between Beatty Branch and Barbecue Branch being located on the Northwest flank of a considerable anticline might also be productive of oil in commercial quantities.

#### ISLAND CREEK POOL

Northwest of the Buffalo Creek region herein described, a number of wells have been drilled within the last two or three years, some of which have been successful. Six miles from the mouth of Island Creek in the vicinity of Island Creek Knob (1300 feet) about five wells have been drilled. The last of these wells was brought in November 7, 1925. and according to report made 40 barrels in four days. This well is 740 feet deep and the oil production came from the "Big Lime." Another well in this vicinity about three miles from Brewers Store drilled in in the Fall of 1925 by Monroe Meguire, E. M. Sexton and others of Beattyville is reported to have produced approximately one barrel per hour natural at a depth of 670 feet. The oil is reported to have tested about 42° baume gravity. This well was contracted for Beamer and Son of Clay City. The production came from the "Big Lime."



Natural gas was discovered in the Island Creek Field by the Owsley Oil and Coal Co. in the Harve Price No. 11 well in 1918. This well gauged flush open flow 1,250,000 cubic feet. A later drilling the Rufus Barker produced 1,100,000 cubic feet. A third gasser, the Aleck Bond No. 1 had an open flow of 1,050,000 cubic feet. Other gassers have also been drilled in this field. The productive "Corniferous" sand is reached at about 1,200 feet in depth. The presence of gas and oil closely developed here indicates that oil wells unusually size when flush will probably be found here. The Island Creek area is considered good perspective territory and may develop an oil pool of exceptional size and value.

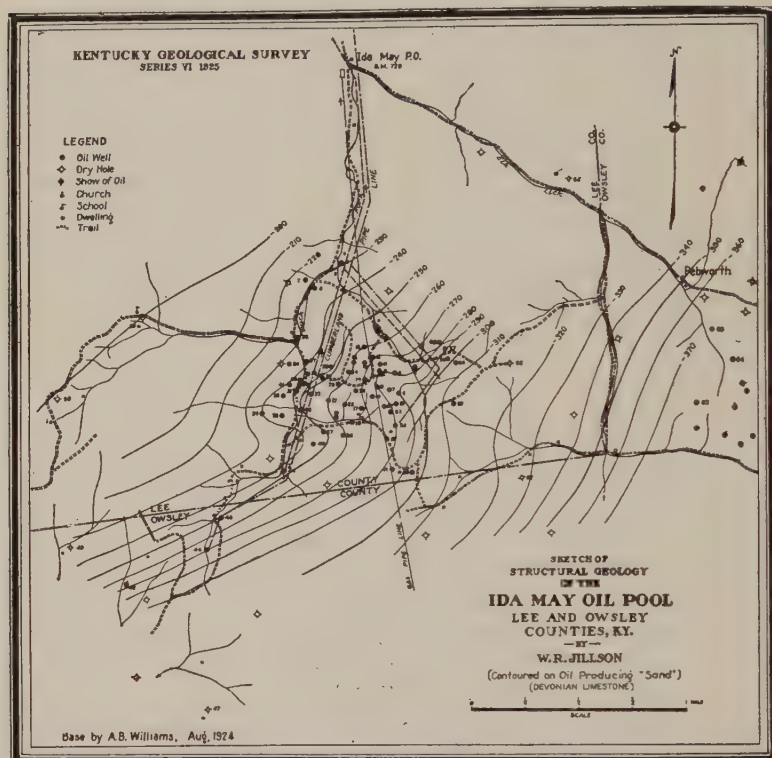
#### CENTRAL OWSLEY COUNTY

Other scattered wells have been drilled to the north of Island Creek Knob; one on the head of Little Sturgeon Creek, and another on the headwaters of the Right Fork of Island Creek. These wells were unproductive. An isolated well of some considerable importance was drilled on the Bowen Pendergrass farm by the Davis Oil Co. at the Forks of White Oak Creek near Major P. O. about  $4\frac{1}{2}$  miles south of Booneville. This well encountered oil and gas in the "Big Lime" at 660 to 662 feet. Other drillings are now being proposed in this vicinity, tentative locations being near the mouth of Cow Creek.

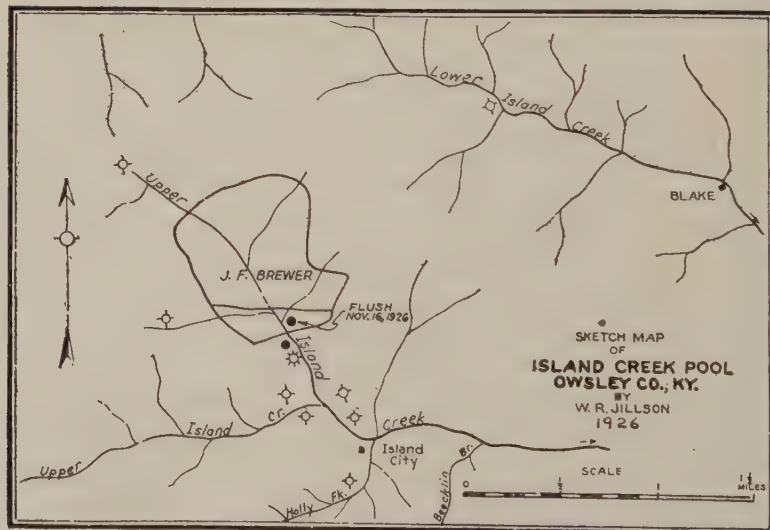
#### BOONSVILLE GAS POOL

Slightly southwest of Booneville the Petroleum Exploration Company has developed a group of leases and produced a considerable gas field. It is located on the waters of Little Sturgeon Creek and it branches principally to the vicinity of Turkey Creek about five miles from the Owsley County seat. The gas producing "sand" is the Corniferous limestone (Devonian). This "sand" is found at a depth of about 1250 to 1350 feet. It is reported that there are about 25 or 30 producing wells in this vicinity most of which are of commercial importance though a few on the edge are but slightly productive or dry. Salt water is reported in a few wells on the southeastern edge of the pool. At the present time there is reported to be about 25,000,000 cubic feet of gas at the casing head "closed in" in this field, showing





GEOLOGICAL MAP IDA MAY POOL.



SKETCH OF ISLAND CREEK OIL POOL.

rock pressure varying from 225 to 360 pounds. A number of dry wells have been drilled on Sturgeon and Little Sturgeon Creeks, and the limits of the gas pool are now well defined.

Carbon black was produced by the Petroleum Exploration Co. for a short time from these wells in the Booneville gas field but following the depression in this industry during the last eighteen months, this work has been abandoned. At the present time efforts are being made to pipe this gas to Central Kentucky where it is greatly needed for city public utility purposes.

#### IDA MAY OIL—PEBWORTH POOLS

About two miles south of Ida May postoffice close to the Lee-Owsley County line, but principally in Lee County, an oil field of more than ordinary importance was discovered by Indian-Tex Petroleum Co. in the fall of 1923. The structure of this field as worked out by the use of well logs and casing head elevation on the "Sand". The oil occurs in the Corniferous (Devonian) limestone which is reached at a depth of about 1250 feet. The productive field is contained within about 8 or 10 leases. Upwards of 120 wells have been drilled in this vicinity and 101 wells are now reported to be producing.

An eastward extension of the field is found on the divide and at the head waters of Elk Fork about  $\frac{1}{2}$  mile south of Pebworth post office in Owsley County. This oil pool is so situated as to be within about one-half mile of the South Fork of the Kentucky River. About twenty wells have been drilled in this vicinity fifteen of which are oil producers. Production in the Ida May pool is from the "Corniferous (Devonian) limestone. Drilling depths are slightly greater due to "down dip" and water shed location.

The peak of production of the Ida May pool, 28,199 barrels was reached in July, 1924, since when the pool has declined. The Pipe Line Co. Casing head elevations range from about 825 to 1150 feet above sea level.

#### IDA MAY OIL POOL.

The best wells in the Ida May Oil Pool were found on portions of the George Botner, David Mays, Spence Flannery and Ben Smith farms. Other close in and productive leases were

the George Porter, J. E. Mays, Widow Porter, Hag Rowland, Rufus Jackson, Louisa Brandenburg, Susie Newman, Fred Evans, Andy J. Combs, John Mays, Fred Edwards and Elmer Evans.

### PETROLEUM PRODUCTION

Ida May Pool, Owsley and Lee Counties, Ky.

1924		1925	
January .....	bbls.	January .....	14,254 bbls.
February .....	180 bbls.	February .....	11,397 bbls.
March .....	2,222 bbls.	March .....	11,921 bbls.
April .....	7,785 bbls.	April .....	11,646 bbls.
May .....	20,291 bbls.	May .....	11,612 bbls.
June .....	25,933 bbls.	June .....	9,939 bbls.
July .....	28,199 bbls.	July .....	8,847 bbls.
August .....	20,135 bbls.	August .....	9,106 bbls.
September .....	24,135 bbls.	September .....	8,250 bbls.
October .....	23,928 bbls.	October .....	7,963 bbls.
November .....	16,395 bbls.	November .....	6,897 bbls.
December .....	18,367 bbls.	December .....	7,472 bbls.
Total .....	187,567 bbls.	Total .....	119,304 bbls.

### CASING HEAD ELEVATIONS\*

Ida May Oil Pool, Lee and Owsley Counties, Ky.

Form	No. Well	Elev.
F. Evans .....	3 .....	1025
E. Evans .....	3 .....	1002
F. Evans .....	1 .....	954
Combs .....	2 .....	929
F. Evans .....	4 .....	973
D. Mays .....	1 .....	819
D. Mays .....	2 .....	1063
D. Mays .....	2 .....	
D. Mays .....	4 .....	1115
D. Mays .....	5 .....	1116
D. Mays .....	6 .....	1100
D. Mays .....	7 .....	872
D. Mays .....	8 .....	1005
D. Mays .....	9 .....	932
D. Mays .....	10 .....	932
D. Mays .....	11 .....	914
W. Porter .....	1 .....	1150
W. Porter .....	2 .....	1122
J. Mays .....	1 .....	1055

\*Supplied by Petroleum Exploration Co., Lexington, Ky.

Form	No. Well	Elev.
J. Mays .....	2 .....	1052
Dora Mays .....	1 .....	1125
E. Newman .....	1 .....	816
Dunagan .....	1 .....	837
B. Smith .....	1 .....	1110
B. Smith .....	2 .....	1118
J. Porter .....	1 .....	1139
G. Porter† (oil) .....	1 .....	1100
G. Porter† (dry) .....	1 .....	1008
C. Jackson .....	1 .....	905
S. Newman .....	1 .....	1054
G. Botner .....	1 .....	1060
G. Botner .....	2 .....	1077
G. Botner .....	3 .....	1013
G. Botner .....	4 .....	983
G. Botner .....	5 .....	989
G. Botner .....	6 .....	959
G. Botner .....	7 .....	1039
G. Botner .....	8 .....	913
G. Botner .....	9 .....	1062
G. Botner .....	10 .....	1071
Brandenburg .....	1 .....	938
Brandenburg .....	2 .....	895
Brandenburg .....	3 .....	929
Gourlay .....	1 .....	824
Jackson .....	1 .....	986
Jackson .....	2 .....	1057
S. Flannery .....	1 .....	970
S. Flannery .....	2 .....	1100
S. Flannery .....	3 .....	1066
S. Flannery .....	5 .....	1062
S. Flannery .....	6 .....	993
S. Flannery .....	7 .....	988
B. Smith .....	1 .....	1051
B. Smith .....	2 .....	1063
B. Smith .....	3 .....	1010
B. Smith .....	4 .....	1002

†Two separate tracts and separate wells.

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Manuscript written December, 1924.

Revised November, 1926.



## IX.

### RECENT PRODUCTION OF PETROLEUM IN KENTUCKY

Petroleum has long been recognized in Kentucky, the first pool having been brought to the surface in this State as the result of salt well drilling operations within the present boundary of McCreary County on the waters of the South Fork of the Cumberland River in 1819.\* Additional discoveries of petroleum at shallow depth in widely separated districts continued to be made in the years which followed up to the time of the Civil War. At this early period—before the prolific Pennsylvania and West Virginia pools began to produce—a number of rich shallow oil fields, recently developed in Kentucky, were definitely indexed.

During the decade which followed the close of the Civil War, interest was again revived in oil production in Kentucky. This came as a natural Southwestward expansion of the industry in Pennsylvania where it had gained a strong foothold as a result of the successful drilling efforts of Colonel Edwin Drake and his associates at Watson's flat on Oil Creek in 1859. In 1883 Kentucky produced a recorded 4,755 barrels which was an average measure for the next decade. During the close of the century, however, in 1899, this volume suddenly increased to 18,280 barrels which marked the opening of the Ragland Oil pool, and indicated the modern expansion of the industry culminating in the production of 1,217,337 barrels in 1905. This volume gradually diminished to 407,087 in 1915.

In 1916 the World War demand for petroleum accompanied by a rapid heightening of prices of crude oil stimulated a new wave of development and "wild-cattling" in Kentucky which brought about the discovery of a number of new pools, chief of which have been the Big Sinking in Lee County, the Warren and Allen County Pools, the Cumberland and Monroe County pools, the Johnson and Magoffin County pools, and the Martha pool in Johnson and Lawrence Counties. Other pools which have been discovered are the Ross Creek, Station Camp,

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\* Oil and Gas Resources of Ky., W. R. Jillson, Series V., Bul. 1, pp. 3-4, 1920, Ky. Geol. Survey.



and Cow Creek pools in Estill County; the Ida May pool in Lee and Owsley Counties, and the Extension of the Busseyville and Louisa pools in Lawrence County. Within the last two or three years the Pellville oil pool in Hancock, Ohio and Daviess Coun-



BARGING LEE COUNTY OIL TO LOUISVILLE

A considerable proportion of Big Sinking petroleum is run by barge down the Kentucky and Ohio rivers to the refineries at Louisville, Ky. This view is on the lower Kentucky.

ties and the Morton's Gap pool in Hopkins County have been opened and successfully extended. Various strikes have also been made the extent of which is at present undetermined in Southern Owsley County on Buffalo Creek, Western Laurel County on Sinking Creek, Western Carter County on Smoky Creek, and elsewhere. Older pools, such as those in Wayne, Whitley, Knox, Floyd, and Knott Counties have been extended in some instances, produced to the end of their economic life, and finally abandoned.

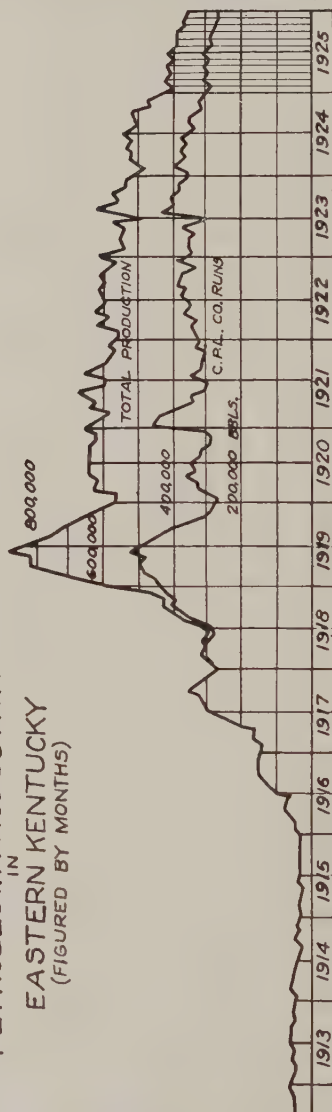
Petroleum production in Kentucky increased from less than one million barrels in 1925 to 1,144,750 barrels in the succeeding year, 1916. From thence on production doubled each year until 1919 when the peak of production in this State 9, 226,473 barrels were produced. During the years which have followed the total production has declined in this State about one million barrels a year; and the rate of decline in some in-

stances as in Lee and Warren counties where the oil has been produced from the Corniferous (Devonian) limestone has been offset by the simultaneous development of new and long life production from such real silica "sands" as the Wier and the Berea (Lower Mississippian) in the Johnson and Magoffin counties pool, and the Martha (Johnson and Lawrence counties) pool in Eastern Kentucky. During 1925 the total petroleum production of this State was 6,658,803.39 barrels. At the present time there are about fifty-three productive oil and gas pools in Kentucky. Some of these have practically reached the economic limit of production, others are now at their peak, while still others are only indexed.

#### KENTUCKY OIL AND GAS FIELDS

(1) Brandenburg Gas Field, Meade County; (2) Cloverport Gas Field, Breckinridge County; (3) Pellville Oil Pool, Hancock, Daviess, and Ohio counties; (4) Hartford Oil Pool, Ohio County; (5) Leitchfield Oil and Gas Field, Grayson County; (6) Meredith Gas Field, Grayson County; (7) Morton's Gap Oil Pool, Hopkins County; (8) Penrod Oil and Gas Field, Muhlenburg County; (9) Diamond Springs Gas Field, Logan County; (10) Warren County Oil and Gas Fields; (11) Simpson County Oil Pools; (12) Allen County Oil and Gas Fields; (13) Barren County Oil Pools; (14) Kettle Creek Oil Pool, Monroe County; (15) Cumberland County Oil Pools; (16) Green River Gas Field, Green and Taylor Counties; (17) Lincoln County Oil Pools; (18) Wayne County Oil Pools; (19) Williamsburg Gas Field, Whitley County; (20) Knox County Oil and Gas Fields; (21) Rockcastle River Gas Field, Laurel and Clay Counties; (22) Oneida Gas Fields, Clay County; (23) Island Creek Gas Field, Owsley County; (24) Ida May Oil Pool, Lee and Owsley Counties; (25) Station Camp Oil Pool, Estill County; (26) Irvine Oil Pool, Estill County; (27) Big Sinking Oil Pool, Lee County; (28) Ross Creek Oil Pool, Estill County; (29) Rothwell Gas Field, Menifee County; (30) Brush Creek Oil Pool, Menifee County; (31) Ragland Oil Pool, Bath and Menifee Counties; (32) Campton Oil Pool, Wolfe County; (33) Stillwater Oil Pool, Wolfe County; (34) Frozen Creek Gas Field,

KENTUCKY GEOLOGICAL SURVEY  
 SERIES VI 1926  
 GRAPH SHOWING  
 PETROLEUM PRODUCTION  
 IN  
 EASTERN KENTUCKY  
 (FIGURED BY MONTHS)

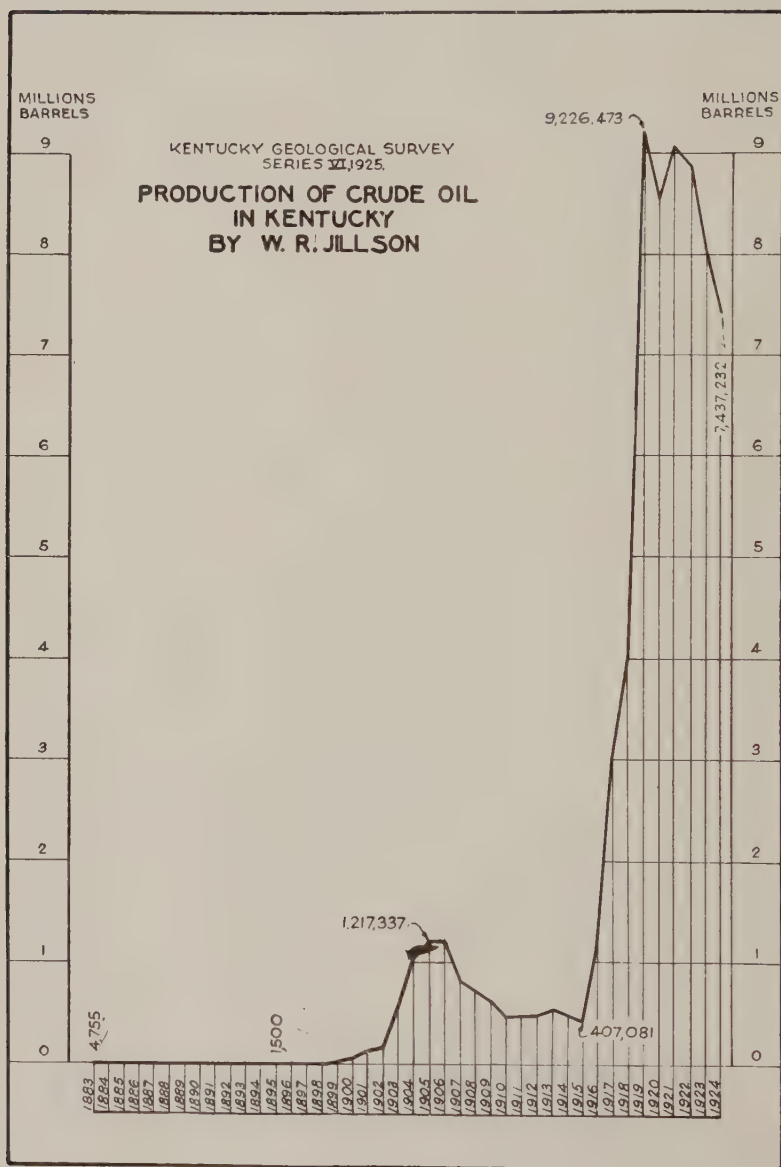


Breathitt County; (35) Hiseville Gas Field, Barren County; (36) Cannel City Oil and Gas Pool, Morgan County; (37) Knott County Oil Pools; (38) Beaver Creek Oil and Gas Field, Floyd County; (39) Burning Fork Gas Field, Magoffin County; (40) Prestonsburg Oil and Gas Field, Floyd County; (41) Paint Creek Oil and Gas Field, Johnson and Magoffin Counties; (42) Laurel Creek Oil and Gas Field, Johnson County; (43) Elliott County Oil and Gas Fields; (44) Martin County Gas Field; (45) Bussyville Oil Pool, Lawrence County; (46) Fallsburg Oil Pool, Lawrence County; (47) Bolts Fork Oil Pool, Boyd County; (48) Ashland Gas Field, Boyd County; (49) Buffalo Creek Oil Pool, Owsley County; (50) Burning Springs Gas Field, Clay County; (51) Booneville Gas Field, Owsley County; (52) Rock Haven Gas Field, Meade County; and (53) Upper Licking River Gas Field, Magoffin County.

The following detailed statement of the production of some of the leading pools of this State showing volume and value within recent years indicates the comparative importance of these several pools. Allen and Warren counties have definitely determined their curves of decline, the latter dropping from a peak of 1,011,238 barrels in 1923 to about 460,000 barrels in 1925. Barren County, all pools considered, is probably at about its peak. Estill County witnessed its peak of 1,109,782 barrels in 1920 and is now low on its decline curve at about 450,000 barrels. Johnson County established its peak at 1,015,005 barrels in 1923 and is now on decline. Lee county found its peak of 5,128,609 barrels in 1920 and in 1925 with only about 1,800,000 barrels is definitely in decline. The Martha Pool in Johnson and Lawrence Counties now producing about ————— barrels annually is the only large pool in Kentucky near its peak of production.

PRODUCTION OF PERTROLEUM IN BARRELS IN KENTUCKY  
FROM 1883 TO 1925

1883	-----	4,755
1884	-----	4,148
1885	-----	5,164
1886	-----	4,726
1887	-----	4,791
1888	-----	5,096
1889	-----	5,096



PRODUCTION OF PETROLEUM IN BARRELS IN KENTUCKY  
FROM 1883 TO 1925—Continued.

1890	6,000
1891	9,000
1892	6,500
1893	3,000
1894	1,500
1895	1,500
1896	1,680
1897	322
1898	5,568
1899	18,280
1900	62,259
1901	137,259
1902	185,331
1903	554,286
1904	998,284
1905	1,217,337
1906	1,213,548
1907	820,844
1908	727,767
1909	639,016
1910	468,774
1911	472,458
1912	484,368
1913	522,550
1914	479,609
1915	407,081
1916	1,144,750
1917	3,015,640
1918	4,035,950
1919	9,226,473
1920	8,546,027
1921	9,080,845
1922	8,889,303
1923	8,087,250
1924	7,437,232
1925	6,658,803

Total 75,600,170

KENTUCKY PETROLEUM PRODUCTION  
Volume and Value 1922

	Bbls.	Value
January	695,022.10	\$1,435,573.63
February	700,120.89	1,417,429.55
March	760,618.28	1,542,858.88



## KENTUCKY PETROLEUM PRODUCTION

Volume and Value 1922

	Bbls.	Value
April .....	724,958.47	1,473,142.95
May .....	797,615.44	1,709,540.72
June .....	752,087.11	1,636,217.39
July .....	770,901.88	1,490,271.97
August .....	792,590.19	1,418,353.52
September .....	648,584.84	1,150,444.69
October .....	853,495.69	1,585,587.64
November .....	681,130.69	1,265,478.07
December .....	712,177.97	1,407,867.33
Totals .....	8,889,303.55	\$17,532,766.34
Value of state tax from petroleum for 1922.....		\$177,732.27
Value of county tax from petroleum for 1922 .....		88,866.13
Total petroleum tax .....		\$266,598.40

In 1921 Kentucky produced 9,080,845 barrels of petroleum valued at \$16,674,960.00. The year 1922, therefore, registers a loss of 191,542 barrels but because of an increase in price per barrel an actual increase of \$857,797.00 in value despite the loss in volume. The peak of volume production of petroleum in Kentucky was reached in 1919 when 9,226,473 barrels were produced. The increase price per barrel, however, made 1920 the banner year for value, oil producers in Kentucky then receiving \$33,556,241.00 or nearly twice as much as they did during 1922.

## OIL FIGURES FROM TAX COMMISSION

1923

	Bbls.	Value
January .....	748,870.11	\$1,816,339.00
February .....	631,100.41	1,716,578.02
March .....	723,129.73	1,759,647.74
April .....	675,236.05	1,583,674.59
May .....	666,934.73	1,345,382.75
June .....	686,646.32	1,166,414.50
July .....	605,779.80	950,910.69
August .....	738,742.66	1,150,346.08
September .....	665,702.65	954,472.43
October .....	682,552.74	915,515.73
November .....	623,176.81	821,673.98
December .....	639,378.17	1,008,960.83
Total .....	8,087,250.18	\$15,189,916.34

RECENT PRODUCTION OF PETROLEUM IN KENTUCKY 299

1924

	Bbls.	Value
January .....	592,350.00	\$1,241,295.72
February .....	596,147.33	1,418,560.50
March .....	669,482.69	1,548,813.65
April .....	640,722.83	1,482,698.06
May .....	653,442.76	1,476,479.80
June .....	619,292.51	1,186,532.24
July .....	678,369.29	1,178,879.54
August .....	611,984.34	1,010,996.27
September .....	620,414.00	1,017,394.54
October .....	624,569.09	1,014,866.52
November .....	569,900.86	921,824.54
December .....	560,557.12	920,640.62
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Total .....	7,437,232.82	\$14,418,982.00

1925

	Bbls.	Value
January .....	563,936.24	\$1,100,235.49
February .....	535,704.41	1,244,107.21
March .....	600,934.25	1,416,884.68
April .....	570,689.16	1,295,090.09
May .....	574,446.08	1,392,017.78
June .....	553,048.58	1,376,310.69
July .....	592,151.01	1,484,164.60
August .....	546,815.39	1,285,033.64
September .....	555,331.11	1,251,706.83
October .....	543,497.46	1,166,079.13
November .....	518,139.82	1,147,126.36
December .....	504,109.88	1,131,411.04
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Total .....	6,658,803.39	\$15,290,167.54

ALLEN COUNTY OIL PRODUCTION

1919

	Bbls.	Value
July .....	67,450.05	\$141,645.11
August .....	53,199.06	111,718.03
September .....	60,880.04	132,740.69
October .....	70,305.61	154,452.00
November .....	57,250.25	129,066.00
December .....	62,546.39	159,558.00
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Total .....	371,631.40	\$829,179.83

	1920	
	Bbls.	Value
January .....	61,629.42	\$176,700.00
February .....	63,248.06	146,349.28
March .....	66,383.72	224,047.55
April .....	96,003.37	327,129.37
May .....	101,552.40	350,085.29
June .....	77,702.42	268,073.33
July .....	75,186.18	260,552.49
August .....	85,760.50	297,607.18
September .....	72,602.84	251,396.37
October .....	76,019.79	283,205.62
November .....	56,916.59	222,774.17
December .....	55,794.82	218,544.36
Total .....	888,809.11	\$2,758,465.01

	1921	
January .....	56,980.56	\$208,105.22
February .....	65,046.89	161,206.12
March .....	57,908.17	77,969.62
April .....	62,685.24	90,384.14
May .....	57,113.12	84,912.56
June .....	52,477.60	53,606.19
July .....	41,049.65	24,138.91
August .....	39,513.21	26,542.64
September .....	39,434.71	31,247.84
October .....	41,694.19	60,799.96
November .....	41,881.11	86,503.90
December .....	44,008.56	91,466.27
Total .....	599,793.01	\$996,883.37

	1922	
January .....	39,078.58	\$64,111.38
February .....	40,537.98	64,234.97
March .....	45,607.74	72,195.58
April .....	46,871.28	74,227.22
May .....	49,555.74	78,490.65
June .....	54,881.63	99,313.94
July .....	67,191.35	107,703.86
August .....	75,431.99	100,360.46
September .....	65,799.67	87,562.10
October .....	62,528.80	87,947.23
November .....	48,642.25	67,635.42
December .....	45,429.22	69,228.31
Total .....	641,556.23	\$973,011.12

RECENT PRODUCTION OF PETROLEUM IN KENTUCKY 301

1923		
	Bbls.	Value
January .....	45,622.50	\$85,196.10
February .....	37,488.27	86,140.23
March .....	44,527.29	106,723.51
April .....	42,611.77	91,951.51
May .....	45,861.08	78,161.17
June .....	45,274.79	68,060.27
July .....	40,899.13	53,008.63
August .....	41,530.98	52,258.95
September .....	36,084.12	43,281.92
October .....	36,310.15	40,091.15
November .....	31,971.45	32,173.13
December .....	29,706.78	31,464.60
Total .....	476,988.31	\$768,521.22

1924		
January .....	23,250.99	\$36,374.76
February .....	29,719.44	62,326.28
March .....	30,452.43	66,958.68
April .....	40,249.80	91,018.59
May .....	39,387.20	80,608.38
June .....	34,604.97	61,852.58
July .....	36,054.26	56,765.78
August .....	31,865.92	43,060.35
September .....	27,848.47	34,951.69
October .....	30,951.55	35,853.36
November .....	23,801.93	29,599.40
December .....	23,272.94	29,100.94
Total .....	371,459.90	\$628,470.79

1925		
January .....	25,360.21	\$32,825.34
February .....	24,368.02	44,700.71
March .....	27,477.70	54,103.88
April .....	28,288.74	55,376.91
May .....	27,752.11	54,366.48
June .....	27,410.99	54,572.13
July .....	28,593.28	58,367.79
August .....	26,279.31	53,598.64
September .....	26,915.87	49,141.71
October .....	22,665.05	40,291.19
November .....	20,973.59	35,980.29
December .....	18,426.16	31,476.96
Total .....	304,511.03	\$564,802.03

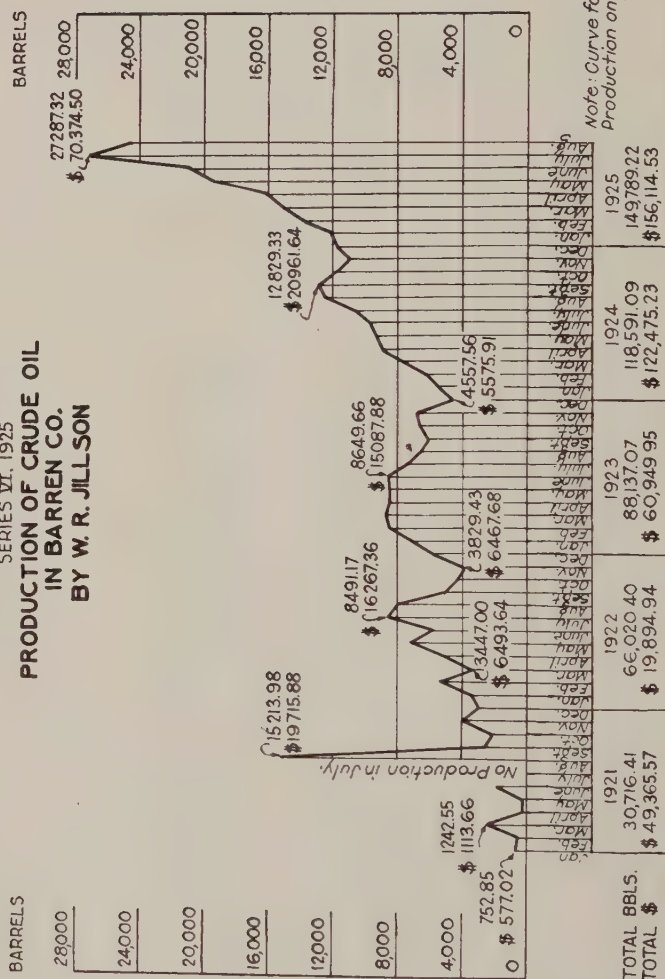
KENTUCKY GEOLOGICAL SURVEY.

SERIES VI, 1925

## PRODUCTION OF CRUDE OIL

IN BARREN CO.

BY W. R. JILLSON



RECENT PRODUCTION OF PETROLEUM IN KENTUCKY 303

1926

	Bbls.	Value
January .....	19,900.08	\$34,206.91

BARREN COUNTY

Producing "Sand:" Devonian limestone (Hamilton and Onondaga) mainly, occasionally from the Silurian limestone (Niagara), and less frequently from the Upper Ordovician.

1921

	Bbls.	Value
January .....	752.85	\$2,409.12
February .....	577.02	1,702.21
March .....	1,242.55	1,113.66
April .....	192.21	115.33
May .....	237.24	332.13
June .....	955.93	1,261.83
July .....		
August .....	15,213.98	19,715.88
September .....	2,559.50	2,790.89
October .....	2,088.74	3,897.57
November .....	4,022.05	9,128.51
December .....	2,874.34	6,898.44
Total .....	30,716.41	\$49,365.57

1922

	Bbls.	Value
January .....	3,487.22	\$6,805.83
February .....	5,413.22	10,082.13
March .....	3,447.00	6,493.64
April .....	5,118.51	9,595.72
May .....	7,140.83	13,368.67
June .....	5,641.93	11,955.84
July .....	8,491.17	16,267.36
August .....	8,139.86	13,319.23
September .....	5,041.48	8,148.77
October .....	4,288.12	7,232.12
November .....	3,829.43	6,467.68
December .....	5,981.63	10,157.95
Total .....	66,020.40	\$19,894.94

1923

	Bbls.	Value
January .....	7,111.96	\$14,564.78
February .....	8,534.60	19,569.84



	1923	
	Bbls.	Value
March .....	8,713.16	22,711.88
April .....	8,492.24	20,135.39
May .....	8,421.22	16,320.07
June .....	8,649.66	15,087.88
July .....	7,488.85	11,141.59
August .....	6,557.05	9,637.46
September .....	6,008.76	8,722.50
October .....	6,761.32	8,829.59
November .....	6,840.69	8,653.06
December .....	4,557.56	5,575.91
Total .....	88,137.07	\$60,949.95

	1924	
January .....	5,556.40	\$9,627.24
February .....	6,368.31	13,817.26
March .....	7,856.38	18,166.72
April .....	3,997.60	21,226.59
May .....	9,309.14	20,576.81
June .....	9,760.93	19,690.09
July .....	10,622.58	19,188.15
August .....	12,525.55	20,830.87
September .....	12,829.33	20,961.64
October .....	11,872.98	19,948.16
November .....	11,039.98	18,560.77
December .....	11,851.91	19,880.93
Total .....	118,591.09	\$122,475.23

	1925	
January .....	12,154.13	\$21,299.91
February .....	13,940.42	30,274.36
March .....	15,264.67	36,712.54
April .....	16,909.57	37,181.24
May .....	19,536.67	45,479.42
June .....	20,919.62	53,169.43
July .....	27,287.32	70,374.50
August .....	24,676.82	61,623.13
Total .....	149,789.22	\$156,114.53

September, October, November, December, 1924, and January and February, 1925, are estimated as a delinquent report for six months was sent in in one lump sum. The amount was divided equally into six parts and distributed among the six months.

ESTILL COUNTY

Producing "Sand:" Devonian limestone (Onondaga)—"Irvine Sand"— and occasionally from the Silurian limestone (Niagaran).  
No deep sands producing.

1919		
	Bbls.	Value
July .....	115,292.15	\$299,759.59
August .....	105,424.38	282,546.23
September .....	102,048.76	275,470.22
October .....	112,489.79	317,913.47
November .....	96,774.06	275,528.39
December .....	93,527.58	300,853.91
Total .....	625,556.72	\$1,752,071.81

1920		
January .....	81,780.77	\$265,686.49
February .....	86,280.31	318,452.00
March .....	104,459.17	391,626.55
April .....	103,392.79	411,416.99
May .....	102,059.18	407,645.68
June .....	94,134.96	376,539.84
July .....	100,288.42	401,153.68
August .....	92,623.76	370,495.04
September .....	97,667.49	413,372.07
October .....	85,477.01	366,942.87
November .....	77,869.50	335,952.21
December .....	83,749.17	341,671.32
Total .....	1,109,782.53	\$4,400,954.74

1921		
January .....	77,415.35	\$193,462.54
February .....	75,508.75	133,821.98
March .....	75,844.94	127,718.69
April .....	74,197.39	145,949.26
May .....	74,043.33	125,104.21
June .....	62,833.10	63,029.52
July .....	59,350.40	55,102.16
August .....	82,786.91	92,701.10
September .....	67,152.44	109,390.64
October .....	62,090.88	148,480.84
November .....	63,462.62	156,274.53
December .....	66,124.46	135,086.59
Total .....	840,810.57	\$1,486,122.06

KENTUCKY GEOLOGICAL SURVEY  
 SERIES VI, 1915  
**PRODUCTION OF OIL  
 IN ESTILL COUNTY**  
 BY W.R. JILLSON

BAREBELLS

115,000

105,000

95,000

85,000

75,000

65,000

55,000

45,000

35,000

25,000

15,000

5,000

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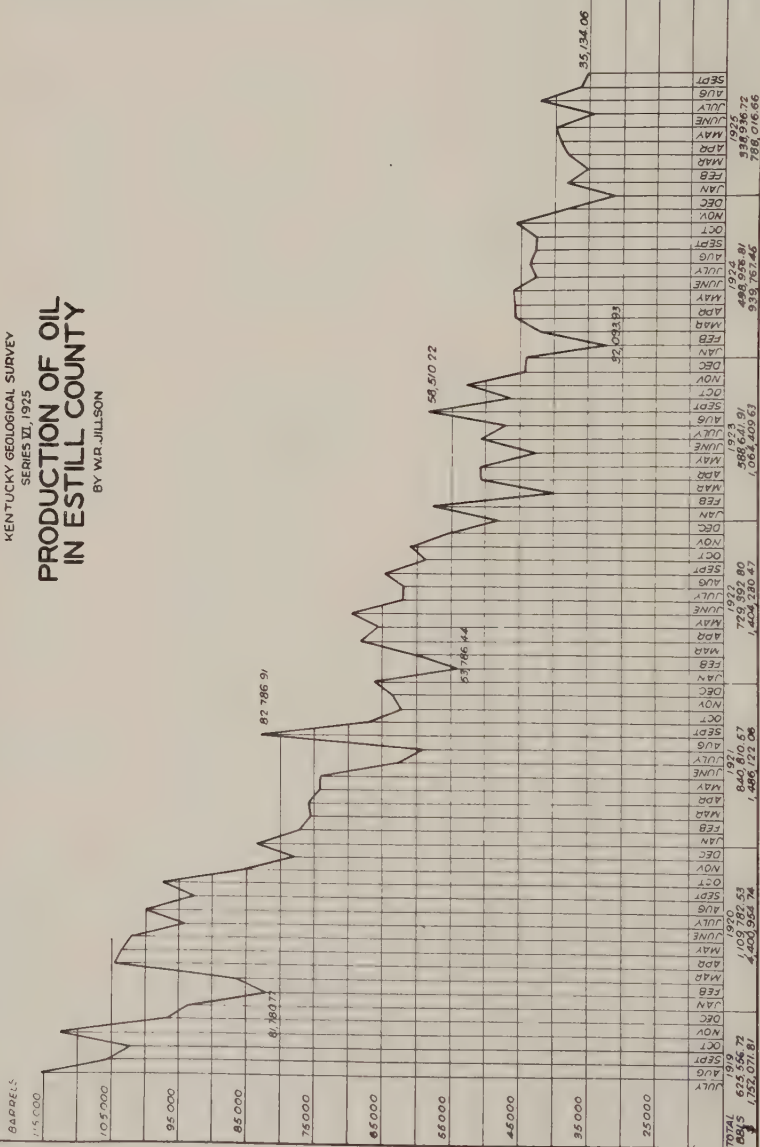
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# RECENT PRODUCTION OF PETROLEUM IN KENTUCKY 307

1922		
	Bbls.	Value
January .....	53,786.44	\$107,343.09
February .....	60,116.98	118,267.56
March .....	68,410.82	134,763.99
April .....	65,526.94	129,393.92
May .....	69,756.76	152,240.44
June .....	62,092.38	137,835.09
July .....	61,844.77	108,793.28
August .....	64,719.24	111,434.63
September .....	58,782.47	101,115.80
October .....	60,986.76	108,483.58
November .....	55,161.49	98,350.87
December .....	48,207.75	96,208.22
Total .....	729,392.80	\$1,404,230.47
1923		
January .....	57,762.84	\$142,916.74
February .....	40,175.79	107,594.37
March .....	50,760.40	121,385.21
April .....	50,862.16	109,766.57
May .....	42,554.57	82,642.66
June .....	50,649.49	79,656.80
July .....	47,063.75	72,464.74
August .....	58,510.22	88,474.21
September .....	48,884.31	66,249.63
October .....	52,834.21	66,664.49
November .....	44,336.50	55,818.26
December .....	44,247.67	70,775.95
Total .....	588,641.91	\$1,064,409.63
1924		
January .....	32,093.93	\$68,435.67
February .....	42,065.84	98,231.57
March .....	45,865.07	108,391.02
April .....	45,862.05	98,507.97
May .....	46,134.56	97,870.61
June .....	42,802.17	76,646.16
July .....	43,524.17	70,664.82
August .....	42,867.42	68,570.26
September .....	42,777.75	68,501.42
October .....	45,669.16	73,008.30
November .....	38,280.66	61,160.88
December .....	31,014.03	49,778.77
Total .....	498,956.81	\$939,767.45

	1925	
	Bbls.	Value
January .....	38,260.01	\$78,185.20
February .....	35,140.70	82,050.66
March .....	38,084.80	89,301.99
April .....	39,132.95	86,384.93
May .....	39,949.57	98,675.56
June .....	34,474.91	86,436.92
July .....	42,496.75	105,944.97
August .....	36,262.97	82,325.25
September .....	35,134.06	78,711.18
October .....	35,439.37	74,363.59
November .....	33,546.45	74,626.33
December .....	28,560.27	64,113.78
Total .....	436,482.81	\$1,001,120.36

	Bbls.	Value
1919 .....	625,556.72	\$1,752,071.81
1920 .....	1,109,782.53	4,400,954.74
1921 .....	840,810.57	1,486,122.06
1922 .....	729,392.80	1,404,230.47
1923 .....	588,641.91	1,064,409.63
1924 .....	498,956.81	939,767.45
1925 .....		

Grand total from July, 1919, to 4,393,141.34      \$11,047,556.16  
 September, 1925, inclusive

### JOHNSON COUNTY

Producing "Sand:" Mississippian sandstone, principally the Wier, and to slight extent the Berea, of Waverly age. No deep sands producing.

	1920	
	Bbls.	Value
April .....	447.98	\$1,899.92
May .....	823.90	3,295.60
June .....	1,642.87	6,571.48
July .....	2,800.07	11,200.28
August .....	4,421.08	17,684.32
September .....	6,186.93	26,294.45
October .....	8,483.72	37,060.72
November .....	9,524.15	41,910.49
December .....	11,018.48	46,067.01
Total .....	45,376.18	\$191,984.27





1921		
	Bbls.	Value
January .....	14,119.46	\$34,200.55
February .....	14,069.95	24,610.63
March .....	18,846.24	32,898.76
April .....	21,176.37	44,781.82
May .....	25,661.76	44,685.36
June .....	24,486.12	24,167.04
July .....	27,153.24	26,696.81
August .....	33,726.94	41,267.80
September .....	30,157.57	56,063.11
October .....	34,538.17	90,687.97
November .....	31,759.13	83,843.70
December .....	39,873.09	85,297.66
Total .....	315,568.04	\$589,201.21
1922		
January .....	39,713.30	\$84,937.11
February .....	40,916.23	87,606.38
March .....	50,050.06	107,280.14
April .....	47,379.54	101,530.77
May .....	53,457.29	127,730.89
June .....	53,078.97	126,906.55
July .....	60,774.94	115,062.77
August .....	63,966.95	120,975.34
September .....	63,842.50	120,598.30
October .....	61,322.26	119,476.35
November .....	68,895.07	134,299.49
December .....	63,370.65	139,467.40
Total .....	666,767.76	\$1,385,871.49
1923		
January .....	75,305.58	\$203,154.75
February .....	70,223.50	199,909.26
March .....	72,627.39	181,302.62
April .....	68,734.86	154,214.60
May .....	75,152.94	153,313.77
June .....	83,026.38	132,875.89
July .....	58,846.90	94,017.02
August .....	106,802.53	170,736.84
September .....	100,737.66	146,133.56
October .....	104,346.86	140,893.65
November .....	98,795.13	133,402.78
December .....	100,406.26	169,371.82
Total .....	1,015,005.99	\$1,879,326.56

# RECENT PRODUCTION OF PETROLEUM IN KENTUCKY 311

1924		
	Bbls.	Value
January .....	96,822.80	\$226,274.59
February .....	94,324.45	234,582.66
March .....	102,727.64	255,433.76
April .....	100,547.84	225,106.52
May .....	102,636.80	229,866.49
June .....	102,396.62	188,551.25
July .....	103,385.12	174,848.19
August .....	95,895.50	162,266.72
September .....	96,387.58	162,995.58
October .....	98,280.85	166,164.89
November .....	91,366.74	154,539.01
December .....	93,903.07	158,803.79
Total .....	1,178,674.51	\$2,339,433.45

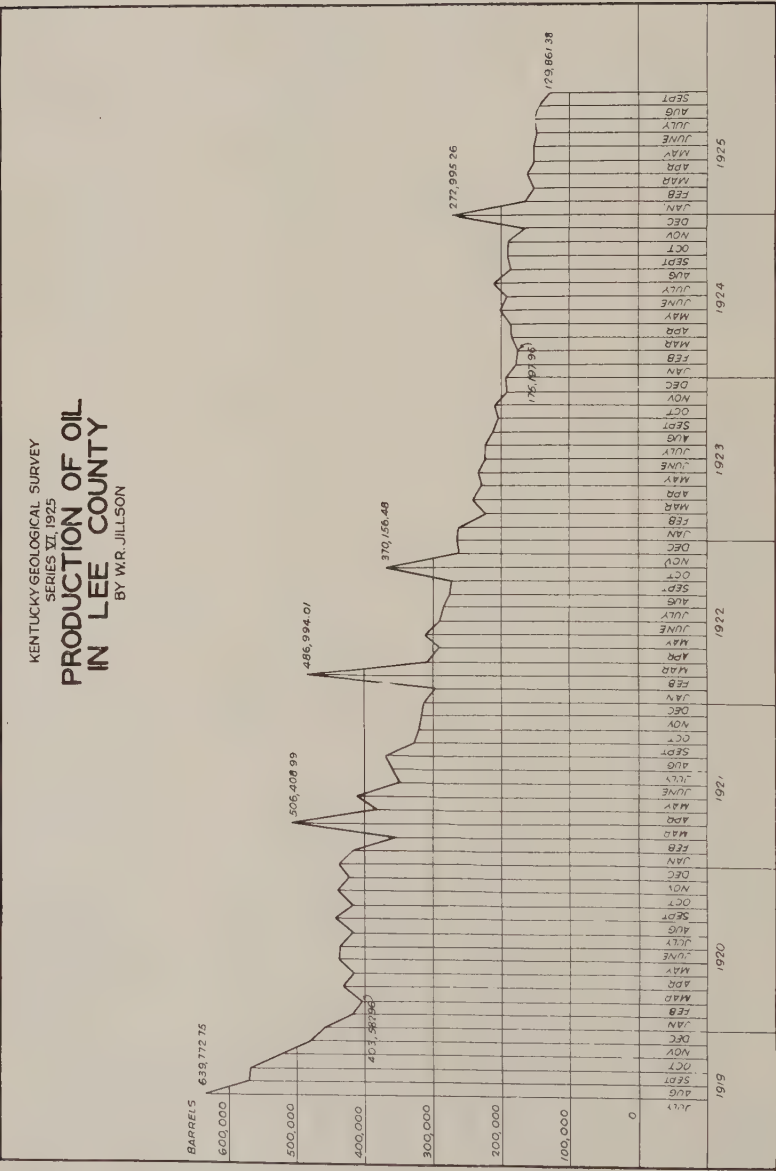
1925		
January .....	90,715.41	\$198,771.00
February .....	82,882.54	202,354.45
March .....	91,600.20	223,726.05
April .....	86,773.75	198,963.24
May .....	86,825.66	225,213.08
June .....	83,616.45	216,883.19
July .....	90,658.68	235,016.77
August .....	81,285.96	190,519.12
September .....	84,202.96	197,224.82
Total .....	778,561.61	\$1,888,671.72

	Bbls.	Value
1920 .....	45,376.18	\$191,984.27
1921 .....	315,568.04	589,201.21
1922 .....	666,767.76	1,385,871.49
1923 .....	1,015,005.99	1,879,326.56
1924 .....	1,178,674.51	2,339,433.45
1925 .....	778,561.61	1,888,671.72

Grand total from April, 1920, to Sept., 1925 inclusive. ....	3,999,954.09	\$8,274,488.70
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## LEE COUNTY

Producing "Sands:" Devonian limestone (Hamilton and Onondaga)—the "Corniferous" or "Big Sinking Sand," and occasionally the Silurian limestone (Niagaran). No deep sands producing.



RECENT PRODUCTION OF PETROLEUM IN KENTUCKY 313

1919

	Bbls.	Value
July .....	639,772.75	\$1,663,409.14
August .....	570,152.39	1,519,903.00
September .....	568,946.10	1,534,407.38
October .....	521,617.12	1,456,213.52
November .....	479,224.56	1,369,661.64
December .....	457,245.34	1,427,717.73
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Total .....	3,236,958.26	\$8,971,312.41

1920

	Bbls.	Value
January .....	\$418,069.06	\$1,358,670.00
February .....	403,582.96	1,435,798.40
March .....	431,191.31	1,615,896.82
April .....	416,928.67	1,600,223.98
May .....	439,172.43	1,744,689.50
June .....	436,977.33	1,751,006.36
July .....	417,217.57	1,672,318.03
August .....	444,610.16	1,782,407.05
September .....	417,395.10	1,719,165.68
October .....	440,410.69	1,943,445.37
November .....	424,487.53	1,915,030.98
December .....	438,567.11	1,917,481.00
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Total .....	5,128,609.92	\$20,456,133.17

1921

	Bbls.	Value
January .....	418,807.84	\$1,361,875.70
February .....	353,594.71	747,371.66
March .....	506,408.99	696,051.05
April .....	381,288.04	765,979.40
May .....	413,708.93	822,648.92
June .....	349,207.17	486,106.64
July .....	360,194.68	351,392.36
August .....	370,682.48	424,444.28
September .....	328,821.65	470,320.93
October .....	321,692.54	715,818.49
November .....	316,333.25	837,199.27
December .....	313,765.79	795,976.14
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Total .....	4,434,506.07	\$8,475,184.84

	1922	
	Bbls.	Value
January .....	297,927.91	659,163.80
February .....	486,994.01	618,559.42
March .....	308,788.74	665,351.00
April .....	291,362.15	627,730.61
May .....	312,893.05	690,715.23
June .....	291,806.89	698,545.35
July .....	285,734.39	616,982.40
August .....	276,772.50	543,179.00
September .....	273,311.17	537,212.11
October .....	370,156.48	727,168.32
November .....	261,559.05	509,664.30
December .....	265,389.58	534,672.37
Total .....	3,722,695.92	\$7,428,943.91

	1923	
January .....	264,088.92	\$630,792.46
February .....	221,473.75	613,080.47
March .....	242,710.68	671,730.29
April .....	230,161.85	589,069.16
May .....	234,613.65	506,481.94
June .....	223,766.03	431,155.77
July .....	224,627.99	379,500.20
August .....	212,803.77	345,997.23
September .....	204,416.99	307,913.35
October .....	210,438.33	299,847.94
November .....	191,420.90	263,894.08
December .....	194,722.11	292,240.77
Total .....	2,655,244.97	\$5,331,703.66

	1924	
January .....	179,958.42	\$359,382.01
February .....	175,197.96	419,891.29
March .....	184,673.28	453,620.95
April .....	186,740.48	462,540.21
May .....	201,420.31	470,944.43
June .....	191,223.16	398,921.98
July .....	211,386.88	396,394.05
August .....	186,775.59	340,477.28
September .....	191,826.95	333,501.75
October .....	190,167.49	330,355.57
November .....	164,474.54	260,976.12
December .....	272,995.26	300,302.04
Total .....	2,336,840.32	\$4,527,307.68

	1925	
	Bbls.	Value
January .....	165,570.59	\$313,226.96
February .....	151,513.72	363,349.70
March .....	162,108.08	403,626.91
April .....	152,323.73	376,913.40
May .....	152,720.15	371,568.16
June .....	148,830.32	389,786.14
July .....	151,597.57	401,146.82
August .....	146,100.19	370,721.71
September .....	129,861.38	311,594.62
October .....	139,860.03	321,474.19
November .....	133,581.60	308,270.88
December .....	130,271.13	311,934.96
Total .....	1,764,338.49	\$4,243,614.51

# WARREN COUNTY

Producing "Sand:" Lower Mississippian limestone and Devonian and Silurian limestone. No deep "Sands" known as commercial producers.

	1919	
	Bbls.	Value
September .....	16,889.50	\$35,819.00
October .....	2,277.24	5,009.93
November .....	1,658.94	3,870.30
December .....	1,754.16	4,408.55
Total .....	22,579.84	\$49,107.78

	1920	
	Bbls.	Value
January .....	1,433.54	\$4,158.11
February .....	4,417.50	13,020.25
March .....	6,082.33	20,421.21
April .....	6,686.07	23,009.02
May .....	11,458.72	41,203.26
June .....	16,294.05	59,053.32
July .....	28,530.91	104,328.91
August .....	34,107.13	124,722.10
September .....	44,432.14	164,356.54
October .....	41,962.82	166,353.45
November .....	35,218.39	136,918.88
December .....	22,008.71	85,211.17
Total .....	252,632.31	\$942,756.22

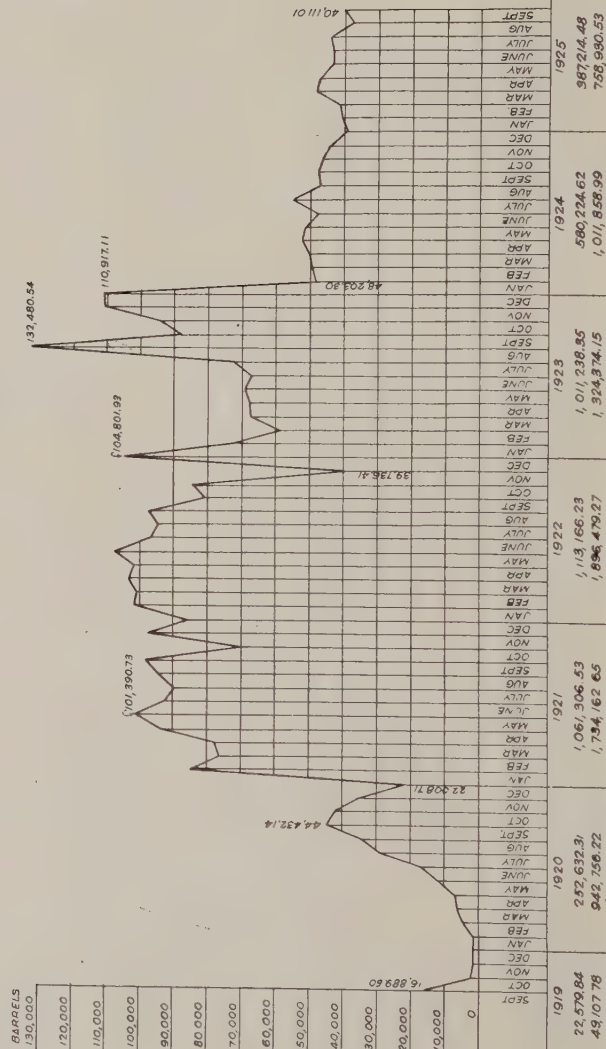


KENTUCKY GEOLOGICAL SURVEY

SERIES VI, 1925

# PRODUCTION OF OIL IN WARREN COUNTY

BY W.R. JILLSON



RECENT PRODUCTION OF PETROLEUM IN KENTUCKY 317

1921		
	Bbls.	Value
January .....	85,110.05	\$299,763.82
February .....	76,320.89	162,529.34
March .....	77,856.77	106,057.34
April .....	93,416.71	146,499.97
May .....	101,390.73	144,307.48
June .....	92,644.05	86,048.74
July .....	89,746.99	56,370.81
August .....	94,749.74	68,652.21
September .....	98,141.57	101,519.00
October .....	69,284.29	169,085.04
November .....	97,205.30	207,070.63
December .....	85,439.44	186,258.27
Total .....	1,161,306.53	\$1,734,162.65
1922		
January .....	101,837.79	\$180,815.30
February .....	100,636.07	174,047.39
March .....	103,222.26	179,287.53
April .....	101,788.85	179,296.53
May .....	107,732.94	189,846.94
June .....	96,883.30	193,867.17
July .....	94,473.42	167,402.00
August .....	97,699.84	147,065.94
September .....	80,228.77	120,939.60
October .....	84,124.65	132,429.81
November .....	39,736.41	57,980.62
December .....	104,801.93	173,500.44
Total .....	1,113,166.23	\$1,896,479.27
1923		
January .....	72,852.75	\$146,043.89
February .....	58,604.70	143,636.89
March .....	67,400.97	171,181.50
April .....	67,793.69	154,004.77
May .....	69,144.24	126,870.99
June .....	67,447.93	114,953.65
July .....	72,190.47	99,750.83
August .....	132,480.54	89,708.66
September .....	87,324.71	77,968.95
October .....	94,258.51	75,340.04
November .....	110,800.00	61,694.96
December .....	110,917.11	63,219.02
Total .....	1,011,238.35	\$1,324,374.15

	1924	
	Bbls.	Value
January .....	48,203.30	\$83,625.77
February .....	49,979.86	106,362.18
March .....	50,013.35	119,588.23
April .....	52,093.27	119,652.00
May .....	51,508.51	108,269.30
June .....	47,932.22	89,132.62
July .....	55,252.39	90,649.09
August .....	47,042.32	66,587.89
September .....	47,936.57	65,716.75
October .....	46,369.57	59,963.64
November .....	44,136.00	48,950.68
December .....	39,757.26	53,360.84
Total .....	580,224.62	\$1,011,858.99

	1925	
	Bbls.	Value
January .....	40,965.01	\$58,330.68
February .....	41,679.23	81,088.17
March .....	48,251.63	100,069.69
April .....	47,381.58	96,555.12
May .....	43,427.08	88,140.33
June .....	43,564.35	87,988.64
July .....	44,145.16	92,254.57
August .....	37,689.43	79,174.44
September .....	40,111.01	75,328.89
October .....	36,915.50	67,879.71
November .....	31,864.08	56,751.89
December .....	33,652.09	59,984.27
Total .....	\$489,664.15	\$943,546.40

## WARREN COUNTY OIL PRODUCTION.

	Bbls.	Value
1919 .....	22,579.84	\$49,107.78
1920 .....	252,632.31	942,756.22
1921 .....	1,061,306.53	1,734,162.65
1922 .....	1,113,166.23	1,896,479.27
1923 .....	1,011,238.35	1,324,374.15
1924 .....	580,224.62	1,011,858.99
1925 .....	.....	.....
	4,428,862.36	\$7,717,669.59

Grand total from September, 1919, to September, 1925, inclusive.

WHITLEY OIL PRODUCTION.\*

Producing "Sands:" Lower Pottsville (Pennsylvanian) Sandstones, and the "Big Lime" (Mississippi). No deep Sands producing.

	1919	
	Bbls.	Value
	Bbls.	Value
August .....	148.09	\$399.84
September .....	149.68	404.14
October .....		
November .....	149.61	426.39
December .....	142.01	461.53
Total .....	589.39	\$1,691.90

	1920	
January .....		
February .....	146.31	\$548.66
March .....	144.60	542.25
April .....	142.12	568.48
May .....	140.55	562.20
June .....	112.82	451.28
July .....		
August .....	140.37	561.48
September .....	148.39	630.65
October .....		
November .....	145.70	619.23
December .....		
Total .....	1,120.86	\$4,484.23

	1921	
January .....	137.60	\$309.80
February .....	140.23	231.38
March .....		
April .....	150.00	292.50
May .....	141.37	226.14
June .....	140.26	126.23
July .....	150.05	135.05
August .....	149.82	164.80
September .....		
October .....		
November .....		
December .....	293.84	558.30
Total .....	1,303.17	\$2,044.19

\*From Cumberland Pipe Line Co.

	1922	
	Bbls.	Value
January .....	.....	.....
February .....	.....	.....
March .....	.....	.....
April .....	.....	.....
May .....	149.75	\$321.96
June .....	.....	.....
July .....	.....	.....
August .....	.....	.....
September .....	115.50	190.58
October .....	.....	.....
November .....	.....	.....
December .....	.....	.....
Total .....	265.25	\$512.54
	Bbls.	Value
Grand total from August, 1919, to November, 1922, inclusive	3,278.67	\$8,732.86

## Production of Martha Oil Pool Lawrence and Johnson Counties, Ky.

	1920	1921	1922	1923	1924	1925
January .....	.....	21,977	51,269	102,860	126,116	137,369
February .....	.....	23,420	53,011	97,947	123,065	126,459
March .....	.....	30,963	61,902	98,269	133,556	138,941
April .....	.....	34,070	61,436	97,575	130,229	133,011
May .....	.....	36,987	67,977	100,151	132,962	135,132
June .....	.....	36,739	63,489	108,767	134,531	131,888
July .....	.....	37,396	78,493	77,184	137,639	138,170
August .....	.....	43,996	84,802	142,362	131,089	131,797
September .....	.....	42,372	85,536	110,908	132,464	132,996
October .....	.....	45,845	87,763	135,707	135,882	137,829
November .....	17,182	42,747	95,401	128,846	133,547	132,525
December .....	19,979	50,961	86,313	130,516	136,131	127,297
Total .....	37,161	447,473	882,392	1,331,092	1,587,212	1,603,414

	Bbls.
1920 .....	37,161
1921 .....	447,473
1922 .....	882,392
1923 .....	1,331,092
1924 .....	1,587,212
1925 .....	1,603,414

Grand total from November, 1920, to December 1925, inclusive ..... 5,888,744

PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY

First Quarter, 1922

COUNTY	January Barrels	January Value	February Barrels	February Value	March Barrels	March Value
Allen	39,078.58	\$64,111.38	40,537.98	\$64,234.97	45,607.74	\$72,195.58
Barren	3,487.22	6,805.83	5,413.22	10,082.13	3,447.00	6,493.64
Bath	1,481.27	1,481.27	1,311.14	1,311.14	1,985.26	1,985.26
Boyd	.....	.....	250.16	528.81	154.20	331.53
Estill	53,786.44	107,343.09	60,116.98	118,267.56	68,410.82	134,763.39
Floyd	331.99	667.03	206.02	391.44	559.96	1,099.17
Jackson	39,713.30	84,937.11	167.43	318.12	328.02	623.24
Knott	169.01	321.12	40,916.23	87,606.38	50,050.06	107,280.14
Lawrence	29,887.76	64,073.69	397.05	796.40	171.96	326.72
Lee	297,927.91	659,163.80	29,160.16	62,409.84	29,418.88	63,036.39
Logan	.....	.....	286,994.01	618,559.42	308,788.74	665,351.00
Magoffin	79,302.67	166,135.16	449.67	822.59	.....	.....
Menifee	1,592.94	3,026.59	82,886.02	173,363.25	93,204.73	195,792.33
Morgan	636.93	1,265.91	1,379.06	2,620.21	1,500.96	2,851.82
McCreary	525.02	997.54	1,211.07	2,445.29	1,180.41	2,350.66
Powell	15,316.29	32,161.89	403.01	765.72	765.02	1,453.54
Simpson	.....	.....	17,877.73	37,100.81	18,155.11	37,798.04
Warren	106,148.71	188,887.87	6,910.53	13,105.05	6,500.00	12,350.00
Wayne	18,382.36	39,014.13	100,636.07	174,047.39	103,240.81	179,322.81
Wolfe	7,253.70	15,180.22	15,892.23	33,900.54	18,522.38	39,308.38
Totals	695,022.10	\$1,435,573.63	7,005.12	1,417,429.55	8,626.22	18,144.64
			700,120.89	\$14,752.49	760,618.28	\$1,542,858.88



PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY—Continued.  
Second Quarter, 1922

COUNTY	April Barrels	April Value	May Barrels	May Value	June Barrels	June Value
Allen	46,871.28	\$74,227.22	49,555.74	\$78,490.65	54,881.63	\$99,313.94
Barren	5,118.51	9,595.72	6,477.83	12,307.87	5,631.93	11,955.84
Bath	959.35	959.35	1,738.57	2,173.21	1,410.51	1,763.14
Boyd	.....	.....	130.44	313.06	212.98	511.15
Cumberland	.....	.....	1,065.59	2,135.60	605.97	1,348.61
Estill	65,526.94	129,393.92	69,756.76	152,240.44	62,092.38	137,835.09
Floyd	305.96	613.57	709.31	1,560.51	748.95	1,610.24
Jackson	20.54	39.03	479.12	1,030.11	166.98	359.01
Johnson	47,379.54	101,530.77	53,457.29	127,730.89	53,068.97	126,906.55
Knott	229.97	436.94	410.84	924.19	281.98	606.26
Lawrence	30,084.08	64,434.28	32,413.20	77,340.32	30,860.30	73,661.25
Lee	291,362.15	627,730.63	312,893.05	690,715.23	291,806.89	627,416.30
Lincoln	116.16	116.16	250.00	500.00	.....	.....
Logan	.....	.....	458.64	825.55	288.06	590.53
Magoffin	91,280.46	191,647.79	104,859.70	246,887.77	103,557.52	243,903.01
Menifee	877.94	1,688.09	1,509.40	3,245.21	917.94	1,973.57
Morgan	911.93	1,843.42	1,212.10	2,786.26	951.94	2,206.41
McCreary	213.97	406.54	827.25	1,985.40	289.98	623.46
Powell	15,158.05	31,585.01	17,808.97	40,214.91	16,631.16	38,773.67
Russell	53.37	113.76	293.70	517.86	101.91	191.69
Simpson	4,067.29	7,727.85	7,443.42	14,114.81	7,562.79	16,146.11
Warren	101,788.85	179,296.53	107,730.74	189,846.94	96,883.30	193,867.17
Wayne	15,816.33	33,446.38	17,572.87	41,556.99	15,518.25	36,720.61
Whitley	.....	.....	149.75	321.96	.....	.....
Wolfe	7,726.73	16,309.99	8,413.16	19,774.98	7,614.79	17,933.78
Totals	724,958.47	\$1,473,142.95	797,615.44	\$1,709,540.72	752,087.11	\$1,636,217.39

PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY—Continued.  
Third Quarter, 1922

COUNTY	July Barrels	July Value	August Barrels	August Value	September Barrels	September Value
Allen	67,191.35	\$107,703.86	75,431.99	\$100,360.46	65,799.67	\$87,562.10
Barren	8,491.17	16,267.36	8,139.86	13,319.23	5,041.48	8,148.77
Bath	1,581.39	1,581.39	1,247.69	1,247.69	1,562.45	1,562.45
Boyd	.....	.....	86.44	164.24	214.54	403.84
Cumberland	129.54	307.79	676.85	1,294.51	409.21	679.98
Estill	61,844.77	108,793.28	64,719.24	111,434.63	58,782.47	101,115.80
Floyd	338.46	593.22	269.78	481.49	551.89	928.87
Jackson	170.46	281.26	442.38	729.93	.....	.....
Johnson	60,774.94	115,062.77	63,966.95	120,975.34	63,842.50	120,598.30
Knott	330.28	586.18	295.28	487.21	170.32	281.03
Lawrence	33,638.71	63,475.18	36,336.86	68,522.18	35,108.35	66,284.75
Lee	285,734.39	616,982.40	276,772.50	543,173.00	180,265.47	351,142.91
Lincoln	100.70	100.70	105.57	105.57	106.71	106.71
Logan	77.86	159.82	152.66	236.62	206.56	320.17
Magoffin	110 280.32	204,695.14	119,772.82	223,693.62	114,583.51	213,987.07
Menifee	924.40	1,525.26	1,123.44	1,853.68	960.80	1,885.32
Morgan	871.54	1,609.57	1,026.79	1,841.56	695.88	1,274.45
McCreary	740.44	1,221.73	416.46	687.16	646.86	1,067.32
Powell	16,329.14	32,121.59	17,539.98	32,517.39	16,058.81	29,697.14
Russell	365.72	868.95	263.48	495.60	116.64	219.40
Simpson	3,043.46	6,057.23	4,504.44	7,278.30	2,830.29	4,627.93
Warren	94,473.42	167,402.09	97,699.84	147,065.94	80,228.77	120,939.60
Wayne	15,286.86	28,674.53	14,909.01	27,842.01	14,202.57	26,463.29
Whitley	.....	.....	.....	.....	115.50	190.58
Wolfe	7,682.56	14,200.76	6,779.88	12,540.16	6,083.49	11,256.91
Totals	770,901.88	\$1,490,271.97	792,590.19	\$1,418,353.52	648,584.84	\$1,150,444.69

## PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY—Continued.

Fourth Quarter, 1922

COUNTY	October Barrels	October Value	November Barrels	November Value	December Barrels	December Value
Allen	62,528.80	\$87,947.23	48,642.25	\$67,635.42	45,429.22	\$69,228.31
Barren	4,238.12	7,232.12	3,829.43	6,467.63	5,981.63	10,157.95
Bath	1,209.07	1,209.07	866.42	866.42	2,268.95	2,268.95
Boyd	925.55	1,786.39	114.78	220.63	88.44	195.45
Cumberland	60,986.76	108,483.58	867.17	1,699.65	2,394.54	4,685.25
Estill	145.80	267.02	55,161.49	98,350.87	48,207.75	96,208.22
Floyd	346.92	593.23	362.29	656.27	303.46	627.15
Jackson	61,322.26	119,476.35	177.12	302.88	---	---
Johnson	316.67	584.66	63,895.07	134,299.47	63,370.65	139,467.40
Knott	40,782.00	79,355.25	170.20	291.04	168.97	331.18
Lawrence	370,156.48	727,168.32	38,937.21	75,773.83	35,563.00	78,153.35
Lee	98.87	98.87	261,559.05	509,664.30	265,389.58	534,672.37
Lincoln	74.18	114.98	104.64	104.64	---	---
Logan	118,244.29	228,276.03	141.61	219.49	---	---
Magoffin	828.92	1,417.45	118,710.00	229,348.94	97,690.57	212,960.95
Menifee	1,193.58	2,212.41	760.46	1,300.39	920.93	1,805.02
Morgan	623.08	1,065.47	554.33	1,036.95	679.38	1,427.68
McCreary	---	---	485.43	830.17	462.96	907.40
Ohio	19,753.18	37,506.39	---	---	257.08	445.37
Powell	89.71	163.75	18,825.58	35,856.83	16,468.40	34,028.21
Russell	3,280.92	5,735.72	152.41	289.58	359.77	631.37
Simpson	84,124.65	132,429.81	426.18	667.10	2,637.60	5,512.73
Warren	14,956.60	28,798.77	39,736.41	57,980.62	104,801.93	173,500.44
Wayne	---	---	14,652.93	28,225.99	13,379.77	29,057.37
Whitley	---	---	---	---	---	---
Wolfe	7,119.28	13,659.77	6,993.15	13,389.00	5,348.39	11,595.21
Totals	853,495.69	\$1,585,587.64	681,130.69	\$1,265,478.07	712,177.97	\$1,407,867.33



TABLE 1—Continued.

1922—									
January	87,824	314,372							557,205
February	89,844	297,645							551,861
March	101,107	323,617							611,126
April	98,252	300,881							573,119
May	111,629	317,473							623,557
June	109,776	296,182							585,798
July	116,996	289,429							596,673
August	125,293	278,640							604,844
September	120,153	275,325							587,253
October	122,814	279,407							604,609
November	123,163	264,750							586,914
December	102,347	267,771							550,845
									7,033,804
1923—									
January	137,062	267,831							614,564
February	116,937	223,506							522,005
March	104,887	253,615							556,058
April	114,965	233,479							546,396
May	106,097	235,540							533,659
June	124,235	235,667							568,901
July	81,427	225,177							478,337
August	141,154	215,925							622,296
September	137,763	206,123							556,131
October	116,623	212,883							574,668
November	110,676	193,094							526,463
December	104,889	196,592							525,262
									6,624,740
1924—									
January	106,728	182,231	741					142	493,712
February	98,038	177,292	495	180				85	488,275





TABLE I—Continued.

	Wayne County	Lawrence, Busseyville & Fallsburg	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
1920—						
November	20,749	10,083	1,014	60,417	1,933	144
December	25,819	12,093	1,032	68,312	1,712	857
1921—						
January	30,454	10,536	1,764	107,540	1,827	259
February	32,964	11,115	1,139	64,747	1,634	276
March	41,396	12,116	1,186	62,787	1,641	772
April	38,544	11,585	1,131	63,011	1,502	869
May	35,996	10,716	1,199	58,799	1,867	504
June	32,368	10,335	525	49,160	936	693
July	24,074	11,496	458	47,031	1,269	368
August	27,826	11,711	1,175	66,680	2,052	872
September	24,494	11,549	1,576	53,085	1,583	594
October	24,257	9,807	331	49,126	1,657	649
November	20,652	11,006	694	50,259	1,348	491
December	19,479	11,571	1,164	50,961	1,606	418
1922—						
January	18,456	9,900	1,089	40,506	1,066	502
February	15,948	10,358	1,847	47,399	1,088	604
March	18,933	9,822	1,780	53,705	1,688	732
April	15,760	9,055	1,236	48,473	2,060	536
May	18,046	11,316	1,577	52,955	2,168	1,120

TABLE I—Continued.

	Wayne County	Lawrence, Russesville & Fallsburg	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
1923—						
June .....	15,471	9,529	1,311	46,214	1,428	1,029
July .....	15,949	9,297	1,312	46,004	1,957	668
August .....	14,897	10,072	1,282	51,347	1,357	562
September .....	14,578	8,148	1,206	46,489	1,089	723
October .....	15,143	9,831	1,554	46,626	1,353	464
November .....	14,702	8,288	749	40,718	1,427	533
December .....	13,383	9,043	864	35,857	989	474
1924—						
January .....	12,354	8,331	1,734	44,262	1,176	736
February .....	12,249	7,349	970	28,848	1,104	441
March .....	12,296	8,983	1,153	38,037	1,350	553
April .....	13,833	8,504	1,309	37,995	983	602
May .....	11,975	7,498	793	29,686	1,429	688
June .....	9,093	8,972	1,063	38,607	1,874	592
July .....	9,001	4,709	897	34,509	1,578	367
August .....	15,558	10,810	854	46,565	1,624	940
September .....	13,202	7,468	1,267	37,341	1,233	928
October .....	11,996	9,082	1,079	41,351	1,434	958
November .....	10,358	6,795	714	34,141	1,583	947
December .....	10,087	8,017	1,040	34,098	1,458	724
1924—						
January .....	9,770	7,610	809	23,842	1,090	1,030
February .....	10,761	6,899	967	31,447	1,445	1,122

TABLE I.—Continued.

	Wayne County	Lawrence, Russellville & Fallsburg	Morgan County	Cow Creek & Pritchburg	Campton & Stillwater	Beaver Creek
March .....	11,167	7,582	1,164	25,031	1,208	1,730
April .....	10,302	7,463	1,287	36,083	1,230	1,759
May .....	12,564	6,866	732	36,124	1,419	1,154
June .....	11,242	6,687	1,183	33,604	1,246	2,612
July .....	11,674	7,976	1,245	32,007	1,977	1,193
August .....	9,443	6,280	988	34,809	2,379	1,136
September .....	10,855	7,067	1,242	34,792	2,131	1,401
October .....	10,009	6,784	990	38,035	2,314	1,615
November .....	8,267	5,814	973	31,453	1,985	1,043
December .....	9,769	6,120	1,334	24,623	2,017	1,257
1925—						
January .....	10,424	6,679	561	32,001	2,388	938
February .....	9,573	5,945	729	28,914	2,357	1,122
March .....	12,420	6,239	541	32,704	2,340	491
April .....	11,581	6,827	931	32,709	2,190	1,130
May .....	12,880	7,295	571	33,160	2,410	1,008
June .....	13,166	6,124	653	27,213	2,380	388
July .....	11,899	6,723	619	35,780	2,273	1,302
August .....	12,096	5,579	711	30,505	1,926	342
September .....	10,972	6,471	587	29,001	1,959	717
October .....	11,311	5,716	640	29,117	2,129	1,576
November .....	9,901	5,341	761	28,540	1,666	676
December .....	11,999	5,158	676	22,857	1,772	825

TABLE I—Continued.

	Ragland	Wagonsville	Ashley	Ross Creek	Martha District	Menifee County
1920—						
November .....	1,281	1,653	48,985	6,106	17,182	10,189
December .....	1,659	1,838	45,704	5,148	19,979	7,810
1921—						
January .....	1,488	1,889	45,000	5,373	21,977	7,787
February .....	854	963	43,000	5,711	23,420	6,992
March .....	2,192	1,783	43,525	5,189	30,963	7,311
April .....	983	620	38,004	4,871	34,070	5,223
May .....	1,849	1,344	41,705	4,664	36,987	5,371
June .....	1,500	643	34,376	3,036	36,739	1,743
July .....	1,533	373	29,152	3,781	37,396	3,858
August .....	1,503	166	35,810	4,447	43,996	3,460
September .....	1,030	157	28,138	5,180	42,372	1,978
October .....	1,684	107	28,836	3,820	45,845	3,040
November .....	166	310	28,713	4,395	42,747	1,647
December .....	2,386	528	32,500	4,948	50,961	1,977
1922—						
January .....	1,481	137	24,818	4,191	51,269	1,594
February .....	1,311	167	27,112	4,209	53,011	1,318
March .....	1,985	611	28,678	4,665	61,902	1,901
April .....	959	1,069	26,003	6,406	61,436	877
May .....	1,739	1,848	29,221	4,882	67,977	1,506

TABLE I—Continued.

	Raigland	Wagsersville	Ashley	Ross Creek	Martha District	Menifee County
June .....	1,411	797	27,546	5,698	68,489	917
July .....	1,581	1,245	27,364	5,362	78,493	915
August .....	1,248	1,156	26,940	6,020	84,802	1,122
September .....	1,562	794	26,667	3,975	85,536	961
October .....	1,209	1,354	30,888	5,315	87,763	839
November .....	866	1,453	29,275	4,722	95,401	762
December .....	2,269	811	26,319	3,486	86,313	919
1923—						
January .....	1,323	81	31,752	4,426	102,860	636
February .....	1,450	590	25,504	4,652	97,947	458
March .....	892	832	29,412	5,147	98,269	530
April .....	1,618	801	29,406	5,074	97,575	135
May .....	2,266	944	32,705	3,887	100,151	
June .....	615	293	33,861	4,421	108,767	765
July .....	1,941	802	35,535	4,963	77,184	91
August .....	1,973	433	38,662	3,799	142,362	1,637
September .....	1,784	370	33,105	4,341	110,908	251
October .....	1,111	555	37,787	4,017	135,707	85
November .....	747	161	33,362	4,240	128,846	799
December .....	1,411	252	33,118	2,771	130,516	289
1924—						
January .....	2,149		28,382	2,989	126,116	83
February .....	724	287	31,423	3,699	123,065	346

TABLE I—Continued.

	Ragland	Wagonsville	Ashley	Ross Creek	Martha District	Menifee County
March .....	1,592	298	42,303	2,721	133,556	786
April .....	1,420	562	29,382	2,219	130,299	259
May .....	2,137	503	31,809	2,627	132,963	
June .....	965	191	28,287	2,226	134,531	403
July .....	1,560	846	33,785	2,744	137,639	
August .....	2,049	133	26,354	1,670	131,089	
September .....	999	77	28,615	2,350	132,464	404
October .....	798	469	27,881	2,562	135,882	255
November .....	1,936	504	24,550	1,430	133,547	
December .....	1,358		23,512	1,585	136,131	481
1925—						
January .....	1,446	63	23,047	1,325	137,369	
February .....	1,479	428	23,309	1,380	126,459	280
March .....	1,417	75	24,040	1,553	138,942	
April .....	1,572	200	22,799	1,450	133,011	397
May .....	1,423	652	23,831	1,601	135,134	273
June .....	753	260	23,453	1,204	131,888	
July .....	2,033	714	22,244	1,812	138,171	347
August .....	1,062	448	22,168	1,151	131,798	
September .....	1,333	575	23,095	1,984	132,996	237
October .....	838	759	20,823	1,371	137,829	121
November .....	1,625	397	20,584	1,268	132,525	137
December .....	1,824	884	19,589	1,125	127,297	145



TABLE II—OIL RUNS

	Menifee	McKinney	Oil Springs	Isonville	Ida May	Bolts Fork	Buffalo	
1920—								
November .....	10,189	95	16,468					
December .....	7,810	83	18,437					
1921—								
January .....	7,787	94	23,901					
February .....	6,992		27,375					
March .....	7,311		39,413					
April .....	5,223		41,491					
May .....	5,371		55,171					
June .....	1,743		56,517					
July .....	3,658		58,255			836		
August .....	3,460		75,373			81		
September .....	1,978		73,301			305		
October .....	3,040		78,372					
November .....	1,647		80,283					
December .....	1,977		89,332					
1922—								
January .....	1,594		87,824					
February .....	1,378		89,844					
March .....	1,901		101,107					
April .....	877	116	98,252					
May .....	1,560		111,629					

TABLE II—OIL RUNS—Continued.

	Menifee	McKinney	Oil Springs	Isonville	Iga May	Bolts Fork	Buffalo
June .....	917		109,776				
July .....	925	101	116,996				
August .....	1,122	106	125,293				
September .....	961	107	120,153				
October .....	829	99	122,814				
November .....	762	105	123,163				
December .....	919		102,347				
1923—							
January .....	636		137,062				
February .....	458		116,937				
March .....	530	102	104,887				
April .....	135	117	114,965				
May .....			106,097				
June .....	765	76	124,235				
July .....	91	156	81,427				
August .....	1,637		141,154				
September .....	251	47	137,763				
October .....	85		116,623				
November .....	799		110,676				
December .....	289		104,889				
1924—							
January .....	83		106,728	741		142	
February .....	346		98,038	495	180	85	

TABLE II.—OIL RUNS—Continued.

	Menifee	McKinney	Oil Springs	Isonville	Ida May	Bolts Fork	Buffalo	
March .....			97,323	664	2,222			
April .....	786		97,499	736	7,785	218		
May .....	259		98,135	533	17,291	86		
June .....			90,264	440	13,433	142		
July .....	403		99,868	789	14,199			
August .....		106	86,725	533	13,135	196		
September .....	404	8	89,534	509	13,135	197		
October .....	255		94,435	885	12,928			
November .....			81,638	438	10,392	181		
December .....	431		85,682	508	10,367		186	4,205,877
1925—								
January .....		50	82,387	809	8,852		325	
February .....	280		74,634	529	7,159	127	247	
March .....			82,330	807	7,689	146	639	
April .....	397		78,301	790	7,746		336	
May .....	273		74,374	660	8,331	275	397	
June .....			72,872	715	6,875		559	
July .....	347		79,994	253	5,623		322	
August .....			70,178	955	6,281	149	499	
September .....	237		75,206	1,043	5,622		600	
October .....	121		71,699	418	5,360	211	382	
November .....	137		68,143	706	4,767		552	
December .....	145		73,554	548	5,098	85		3,565,665

TABLE II—OIL RUNS—Continued.

	Wayne County	Lawrence County	Morgan County	Cow Creek & Fitchburg	Campion & Stillwater	Beaver Creek
1920—						
November .....	20,749	10,083	1,014	60,417	1,933	144
December .....	25,819	12,093	1,032	68,312	1,712	857
1921—						
January .....	30,454	10,536	1,764	107,540	1,827	259
February .....	32,964	11,114	1,139	64,747	1,634	276
March .....	41,395	12,116	1,186	62,787	1,641	772
April .....	38,544	11,585	1,131	60,311	1,502	869
May .....	35,996	10,716	1,199	58,799	1,867	504
June .....	32,368	10,335	525	49,160	936	693
July .....	24,074	11,497	458	47,031	1,269	368
August .....	27,826	11,711	1,175	66,680	2,052	872
September .....	24,495	11,549	1,576	53,085	1,583	594
October .....	24,267	9,807	1,583	49,126	1,006	649
November .....	20,651	11,006	1,354	50,259	688	491
December .....	19,479	11,738	1,559	50,961	1,211	419
1922—						
January .....	18,456	9,900	1,089	40,506	1,066	502
February .....	15,948	10,358	1,847	47,399	1,088	604
March .....	18,933	9,827	1,780	53,705	1,688	732
April .....	15,760	9,055	1,236	48,473	2,060	536
May .....	18,046	11,316	1,677	52,955	2,168	1,120

TABLE II—OIL RUNS—Continued.

	Wayne County	Lawrence County	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
1923—						
June .....	15,471	9,529	1,311	46,214	1,428	1,029
July .....	15,949	9,297	1,312	46,004	1,957	668
August .....	14,897	10,072	1,282	51,347	1,357	562
September .....	14,518	8,148	1,206	46,489	1,089	723
October .....	15,143	9,831	1,554	46,626	1,353	464
November .....	14,702	8,288	749	40,718	1,427	533
December .....	13,383	9,043	864	35,857	989	474
1923—						
January .....	12,354	8,331	1,734	44,262	1,176	736
February .....	12,249	7,349	970	28,848	1,104	441
March .....	12,296	8,983	1,153	38,037	1,350	553
April .....	13,833	8,504	1,309	37,995	983	602
May .....	11,975	7,498	793	29,686	1,429	688
June .....	9,093	8,972	1,063	38,607	1,874	592
July .....	9,001	4,709	897	34,509	1,578	367
August .....	15,558	10,810	854	46,565	1,624	940
September .....	13,202	7,468	1,267	37,341	1,233	928
October .....	11,996	9,082	1,079	41,351	1,434	958
November .....	10,358	6,795	714	34,141	1,583	947
December .....	10,087	8,017	1,040	34,098	1,458	724
1924—						
January .....	9,770	7,610	809	23,842	1,090	1,030
February .....	10,761	6,899	967	37,145	1,445	1,122

TABLE II—OIL RUNS—Continued.

	Wayne County	Lawrence County	Morgan County	Cow Creek & Pritchburg	Campton & Stillwater	Beaver Creek
March .....	11,167	7,582	1,164	53,284	1,208	1,730
April .....	10,302	7,463	1,287	36,083	1,230	1,759
May .....	12,564	6,866	732	36,124	1,419	1,154
June .....	11,241	6,687	1,183	33,604	1,246	2,612
July .....	11,674	7,976	1,245	32,007	1,977	1,193
August .....	9,443	6,280	988	34,809	2,379	1,136
September .....	10,855	7,067	1,242	34,792	2,131	1,401
October .....	10,009	6,784	990	38,035	2,314	1,615
November .....	8,267	5,814	973	31,453	1,985	1,043
December .....	9,769	6,120	1,334	24,623	2,017	1,257
1925—						
January .....	10,171	6,679	561	32,001	2,388	938
February .....	9,338	5,945	729	28,914	2,357	1,122
March .....	12,175	6,239	541	32,704	2,340	491
April .....	11,342	6,827	931	32,709	2,190	1,130
May .....	12,650	7,295	671	33,160	2,410	1,008
June .....	12,947	6,124	653	27,213	2,380	388
July .....	11,692	6,723	619	35,780	2,273	1,302
August .....	11,888	5,579	711	30,505	1,926	342
September .....	10,739	6,471	587	29,001	1,959	717
October .....	11,065	5,716	640	29,117	2,129	1,576
November .....	9,672	5,341	761	28,540	1,666	676
December .....	11,769	5,158	676	22,857	1,772	825



TABLE II—OIL RUNS—Continued.

	Ragland	Wagersville	Ashley	Torrent and Lee Co.	Ross Creek	Martha District
1920—						
November .....	1,281	1,653	31,179	109,941	6,106	17,182
December .....	1,659	1,837	28,242	115,984	5,147	19,979
1921—						
January .....	2,977	1,889	60,783	176,766	5,373	21,977
February .....	854	963	62,579	194,694	5,711	23,420
March .....	2,192	1,785	32,467	142,266	5,189	30,962
April .....	983	620	25,166	103,088	4,871	34,070
May .....	1,848	1,344	26,752	107,838	4,664	36,987
June .....	1,500	643	22,831	93,379	3,036	36,739
July .....	1,533	373	14,756	93,020	3,781	37,396
August .....	1,503	166	20,723	92,421	4,447	43,996
September .....	1,030	157	14,833	82,415	5,180	42,372
October .....	1,684	107	15,115	79,482	3,820	45,835
November .....	166	310	14,136	75,581	4,394	42,747
December .....	2,386	528	17,993	79,384	4,948	50,951
1922—						
January .....	1,481	137	11,767	84,503	4,191	51,269
February .....	1,311	167	14,683	81,680	4,209	53,011
March .....	1,985	611	14,168	80,896	4,665	61,902
April .....	959	1,069	12,350	71,175	6,406	61,436
May .....	1,739	1,848	15,057	72,012	4,882	67,977

TABLE II—OIL RUNS—Continued.

	Ragland	Wagerstville	Ashley	Torrent and Lee Co.	Ross Creek	Martha District
1923—						
June .....	1,411	797	14,134	71,142	5,698	68,489
July .....	1,581	1,245	13,552	60,297	5,362	78,493
August .....	1,248	1,156	14,936	60,197	6,020	84,802
September .....	1,562	794	13,781	57,439	3,975	85,536
October .....	1,209	1,354	15,845	62,127	5,315	87,763
November .....	866	1,453	15,299	57,034	4,722	95,401
December .....	2,269	811	11,650	53,980	3,486	86,313
1923—						
January .....	1,323	81	16,996	59,381	4,426	102,860
February .....	1,450	590	13,084	50,866	4,652	97,947
March .....	892	832	14,350	55,101	5,147	98,269
April .....	1,618	801	14,971	53,420	5,074	97,575
May .....	2,266	944	16,787	49,313	3,887	100,151
June .....	615	293	18,591	50,524	4,421	108,767
July .....	1,941	802	20,662	51,422	4,963	77,184
August .....	1,973	433	22,259	47,028	3,799	142,362
September .....	1,784	370	20,511	49,335	4,341	110,908
October .....	1,111	555	22,371	53,365	4,017	135,707
November .....	747	161	19,562	48,605	4,240	128,846
December .....	1,411	252	19,340	49,436	2,771	130,516
1924—						
January .....	2,149	287	16,507	45,025	2,989	126,116
February .....			17,824	41,897	3,699	123,065

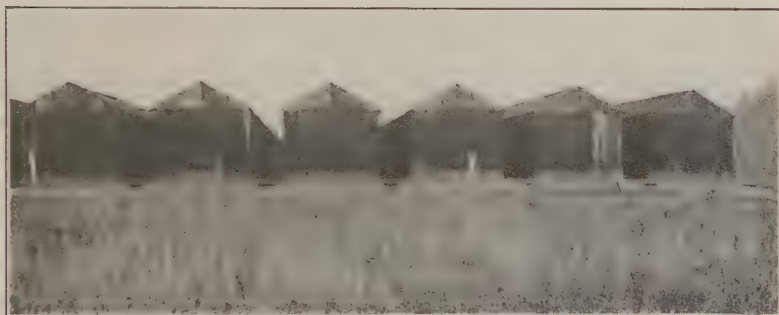
TABLE II—OIL RUNS—Continued.

	Ragland	Wagersville	Ashley	Torrent and Lee Co.	Ross Creek	Martha District
March .....		298	27,931	51,596	2,721	133,556
April .....		562	16,175	42,486	2,219	130,299
May .....		503	17,523	43,827	2,627	132,963
June .....		191	14,426	39,930	2,226	134,531
July .....		846	18,740	41,291	2,744	137,639
August .....		133	9,660	34,935	1,670	131,089
September .....		77	11,282	36,310	2,350	132,464
October .....		469	10,102	36,109	2,562	135,882
November .....		504	9,207	30,655	1,430	133,547
December .....			8,668	33,698	1,585	136,131
1925—						
January .....		63	6,839	25,755	1,325	137,369
February .....		428	8,845	21,864	1,380	126,459
March .....		75	9,332	20,782	1,553	138,942
April .....		200	7,393	17,382	1,450	133,011
May .....		652	10,171	18,734	1,601	135,134
June .....		260	7,427	18,793	1,204	131,888
July .....		714	7,873	20,410	1,812	138,171
August .....		448	8,366	17,200	1,151	131,798
September .....		575	8,026	17,531	1,984	132,996
October .....		759	7,419	17,091	1,371	137,829
November .....		397	7,848	16,944	1,268	132,525
December .....		884	6,495	15,570	1,125	127,297

## X.

### NATURAL GAS PRODUCTION IN KENTUCKY DURING YEARS 1923-24-25.

Within the last few years much interest has been shown in the development of natural gas in Kentucky. The growth of urban centers and industrial enterprises in this State has been responsible for the increased demand for this natural fuel. At



CARBON PLANT IN TAYLOR COUNTY

This general industry consuming vast quantities of natural gas has greatly decreased in Kentucky during recent years due to soft markets brought about by great increases in carbon black stocks produced in the Southwestern States, particularly Louisiana and Texas.

the same time a growing realization of the practical impossibility of increasing the supply imported from West Virginia sources has turned the attention of gas field operators to the slightly drilled areas in the remote parts of Kentucky. Co-incidentally fields partly explored and indexed have been drilled up, and several old close-in, and practically abandoned fields have been re-drilled to deeper sands with remarkable success. At the present time much natural gas is developed and "closed in" at the casing head awaiting suitable marketing conditions or long distance pipe line connections. This is true not only of individual wells, but of entire pools. Kentucky's open flow volume of natural gas could be greatly increased, therefore, upon short notice, if consuming markets and pipe line transportation were improved.

During the last year large corporate and individual producing interests serving public utility and industrial needs have taken up very extensive prospective oil and gas acreage in many parts of Kentucky, particularly the "Mountains of Eastern Kentucky." This farsighted movement entails a certain necessary amount of well distributed drilling exploration, which coupled with an intelligent use of the new county structural and geological oil and gas maps recently prepared by the Kentucky Geological Survey, and now available for all of the twenty-seven "Mountain" counties should lead to the discovery in the immediate future of greatly increased amounts of natural gas in this State.

An accurate survey of the natural gas fields of Kentucky has never been executed due to the very considerable cost connected with such a project. Furthermore it is doubtful whether the results obtained would justify the expenditure of either the time or money necessarily invested. In individual operations fluctuations of production are not uncommon caused by varying seasonal demand and a certainly diminishing pool supply in the "sands." Because of widespread successful exploratory and offset drilling, however, open flow volume for the entire State of Kentucky figured on a three year basis shows a steady actual increase. This increase is registered both in volume and value despite the fact that the carbon black industry has diminished very considerably during the same time. In the following tables the writer has attempted to present by way of personal estimate the recent productive status of the natural gas fields of Kentucky.

ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY  
DURING YEAR 1923

NAME	Public Utilities.		
	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Lou. Gas. & Elec. Co., (Floyd, Johnson and Magoffin Cos.) .....	2,000,000	10c	\$200,000.00
Lou. Gas. & Elec. Co. (Meade Co.) .....	80,000	10c	8,000.00
Various Small Producers Throughout Kentucky. Public Utilities and Industrial Co. ....	1,000,000	10c	100,000.00

ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY  
DURING YEAR 1923

Public Utilities.			
NAME	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Central Ky. Natural Gas Co. (John- son, Breathitt, Magoffin & Meni- fee Cos.) .....	2,000,000	10c	200,000.00
United Fuel Gas Co., Martin Co. (Lou. Gas. & Elec. Co., Pur.).....	540,000	20c	108,000.00
Carbon Black Producers.			
Eastern Carbon Co., Davis Bros. (Floyd and Knott Cos.) .....	2,500,000	5c	125,000.00
Midas Oil and Gas Co. (Floyd Co.)	2,400,000	5c	120,000.00
United Carbon Co. (Green and Taylor Cos.) .....	2,000,000	5c	100,000.00
Liberty Carbon Co. (Floyd Co.).....	750,000	5c	37,500.00
Grand total volume in		Grand total	
cubic feet .....	14,020,000	value.....	\$1,036,000.00

ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY  
DURING YEAR 1924.

Public Utilities.			
NAME	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Lou. Gas. & Elec. Co. (Floyd, John- son and Magoffin Cos.) .....	1,800,00	10c	\$180,000.00
Lou. Gas. & Elec. Co. (Meade Co.)..	78,000	10c	7,800.00
Various Small Ky. Producers, Pub- lic Utilities and Industrial Cos.....	1,500,000	10c	150,000.00
Central Ky. Natural Gas Co. (John- son, Breathitt, Magoffin & Meni- fee Cos.) .....	2,300,000	10c	230,000.00
United Fuel Gas Co., Martin Co. (Lou. Gas. & Elec. Co., Pur.).....	500,000	20c	100,000.00
Carbon Black Producers.			
Eastern Carbon Co., Davis Bros. (Floyd and Knott Cos.) .....	2,200,000	5c	\$110,000.00
Midas Oil and Gas Co. (Floyd Co.)	2,000,000	5c	100,000.00
United Carbon Co. (Green and Taylor Cos.) .....	1,300,000	5c	65,000.00
Liberty Carbon Co. (Floyd Co.).....	900,000	5c	45,000.00
Petroleum Exploration Corp. (Owsley Co.) .....	400,000	5c	20,000.00
Grand total volume in		Grand total	
cubic feet .....	12,978,000	value.....	\$1,007,800.00



# ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY DURING YEAR 1925

## Public Utilities.

NAME	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Lou. Gas. & Elec. Co. (Floyd, Johnson and Magoffin Cos.) .....	1,600,000	10c	\$160,000.00
Lou. Gas & Elec. Co. (Meade Co.) ..	75,000	10c	7,500.00
Small Kentucky Producers (L. G. & E. Co., Pur.) .....	2,000,000	12c	240,000.00
Fych Oil & Gas Co. (L. G. & E. Co., Pur.) .....	1,000,000	12c	120,000.00
Central Ky. Nat. Gas Co. (Johnson, Breathitt, Magoffin and Meniffee Cos.) .....	1,000,000	10c	100,000.00
Small Producers (Central Ky., Purchase) .....	1,300,000	12c	156,000.00
United Fuel Gas Co., Martin Co. (L. G. & E. Co., Pur.) .....	350,000	21c	73,500.00
Small Utilities (Green, Taylor, Muhlenberg, Barren and Grayson Cos.) .....	1,000,000	10c	100,000.00
Amer. Rolling Mill Co. (Boyd Co.) ..	1,000,000	20c	200,000.00

## Carbon Black Producers.

Eastern Carbon Co., Davis Bros. (Floyd and Magoffin Cos.) .....	2,000,000	5c	100,000.00
Midas Oil & Gas Co. (Floyd Co.) .....	1,200,000	5c	60,000.00
Liberty Carbon Co. (Floyd Co.) .....	1,000,000	5c	50,000.00
United Carbon Co. (Green and Taylor Cos.) .....	750,000	5c	37,500.00
Grand total volume in cubic feet .....	14,275,000	Grand total value .....	\$1,404,500.00

Manuscript written August 1926.

## XI.

### TOPOGRAPHIC BASE MAPPING IN KENTUCKY\*

The progressive attitude of any State or minor political locality may be quickly interpreted by an inquiry as to the amount and kind of detailed base mapping within its bounda-

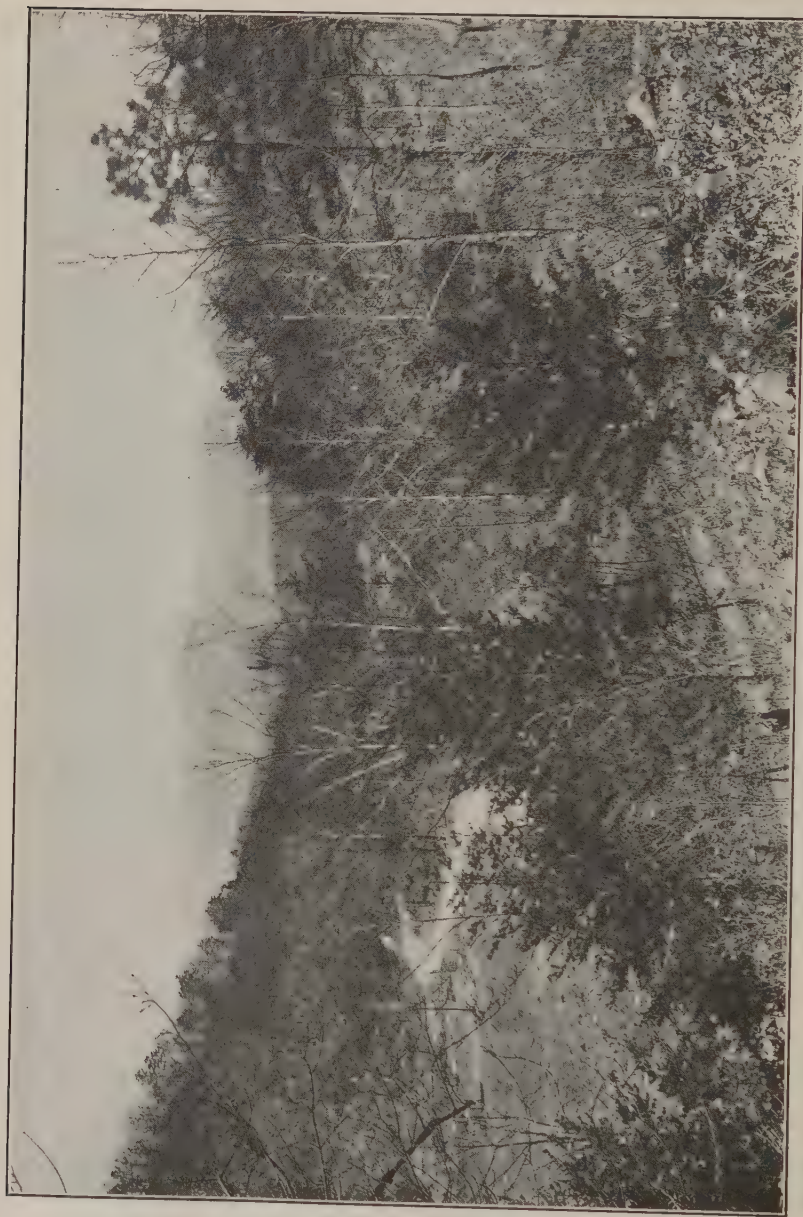


Portion of new Frankfort Quadrange; Reduced.

ries. The wilderness was unmapped and uncharted and therefore presented obstacles to every early movement of men and commodities. These unknown obstacles in many cases were almost insurmountable. Civilization with its demand for agricultural, mineral and industrial development has long realized the necessity of accurate base maps, and since earliest time the attention of cartographers and engineers has been directed

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\* Revised reprint from "Bond Issue Campaign Book," Louisville, Ky., 1924.



LOG MOUNTAINS, BELL COUNTY, KENTUCKY

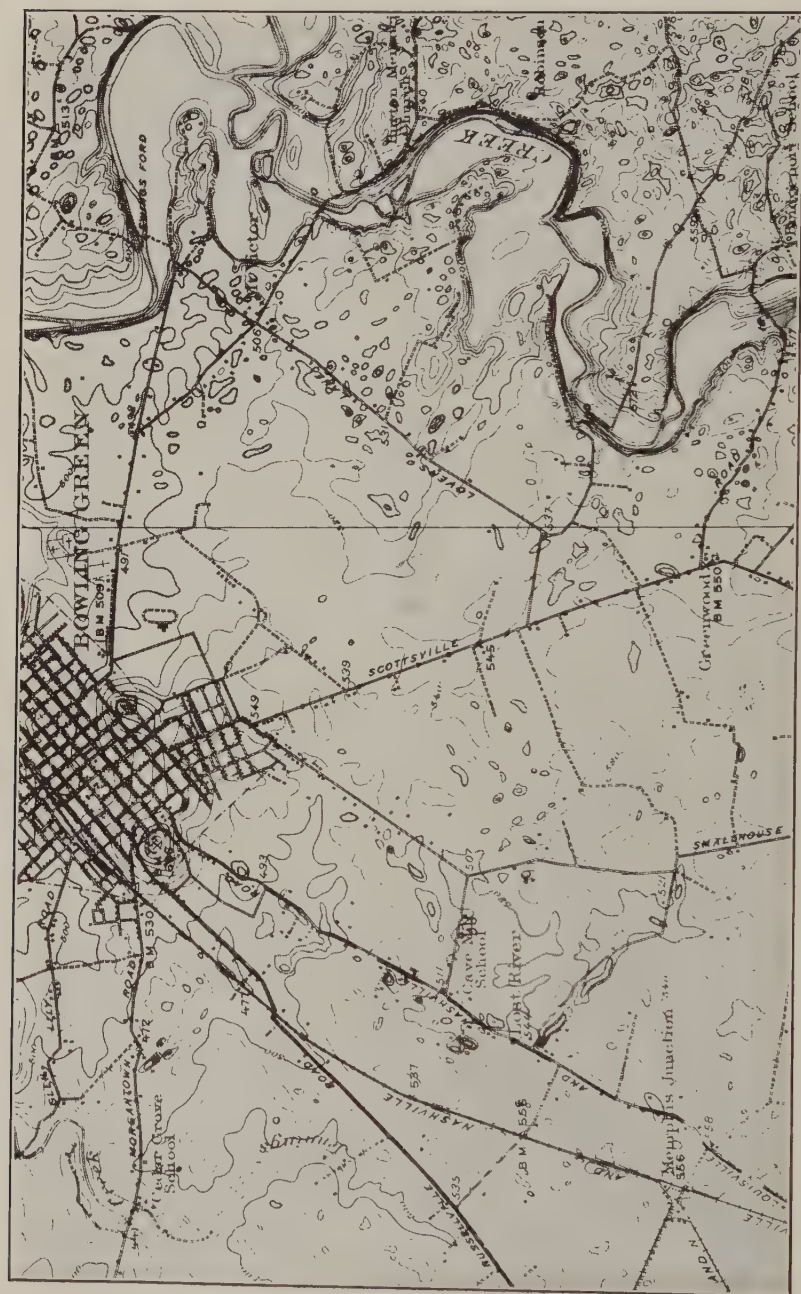
The old Cumberland Gap sheet, scale 1:125,000, covers this portion of the Middlesboro basin. Mineral wealth here indicates the need of new topographic maps.

towards the improvement of detailed mapping of the subsurface of the earth. The degree of success which has attended efforts of this character is apparent when one compares the maps prepared in the day of Columbus or John Smith to one of the splendid copper engravings now prepared by the best processes of the United States government. Inaccuracy has given way to accuracy. Lack of detail has given way to extreme detail until today the United States Geological Survey's standard topographic map, scale 1:62,500 or about 1 inch to the mile, shows in addition to hills, streams and roads every important bit of culture and mineral development in the countryside.

These excellent maps are prepared in uniform size and are known as "fifteen minute quadrangles." They are about fourteen miles on an east and west line and eighteen miles on a north and south line. Prepared in colors they portray not only the physical appearance of that portion of the earth which they cover, but also show all of the important development wrought by man. They constitute an excellent base upon which highway surveys, land surveys, railroad surveys, agricultural surveys, soil surveys, mineral surveys, hydro-electric surveys, geological surveys, drainage surveys, forestry surveys, sanitary surveys, aerial routes, military routes, and artificial inland waterways may be outlined and constructed. The cost of the preparation of a topographic map is more than that of a simple road map because of the vast amount of important detail information placed upon it.

A topographic map shows, for instance, every road, lane, trail, bridge, tunnel, and house, as well as the cities and small towns in their fullest extent. Pipe line and railroad routes are accurately portrayed. The value in preparing such a kind of map is that it will serve excellently any purpose for which any kind of map is desired. On these maps the forested areas are shown in tints of green, areas of swamp by appropriate symbols; and every hill and valley or depression is portrayed by use of the continuous line of brown on which actually surveyed elevations are marked. By this method the elevation of any point within a topographically surveyed area can be known within a few feet dependent upon the interval between the brown contours. Furthermore metal and cement monu-





Portion of New Bowling Green Quadrangle; Reduced.

ments are established throughout all surveyed areas on which the absolute elevation of that particular point above sea level is inscribed for the free use of any and all who may desire this kind of information.

The need of accurate topographic base maps in the State of Kentucky has been realized for a number of years. Mineral operators including those interested in the development of the coal, oil, gas, building stones, fluorspar, clays and other mineral resources of this State have been insistent that these maps be prepared so that the State might have an accurate base map upon which to indicate the occurrence of each of these and other important mineral resources. The work of mapping this State has been carried forward co-operatively by the Kentucky Geological Survey and the United States Geological Survey upwards of twenty years, but with very small appropriations. Up until 1920 this State appropriated only \$10,000 a year for this purpose. This fund was met by an equal appropriation from Washington through the U. S. Geological Survey, which department furnished the men and the instruments, while the Director of the Kentucky Geological Survey designated the areas to be surveyed.

At the present time upwards of 76 separate topographic sheets or maps have been prepared for portions of Kentucky, and may be received from the State Geological Survey at Frankfort. The total area thus surveyed on July 1, 1925, was equivalent to 20,723 square miles, and the area unmapped on this date was 19,875 square miles; giving a total of 40,598 square miles, or the area of Kentucky. Broadly speaking, about one-half of Kentucky is now mapped. The areas which have been topographically mapped consist principally of the Eastern and Western coal fields together with certain areas closely adjoining. The territory from Olive Hill in Eastern Kentucky to Lexington, and north almost to Covington is unmapped, as is the broad region extending south of Louisville to the Tennessee line, and westward through Logan and Christian Counties to the Mississippi River. All of Central Kentucky from Bardstown to Somerset and to Tompkinsville back to Bardstown is unsurveyed topographically.





A PANORAMA NEAR BENTON, KENTUCKY

There are at present no topographic maps in all the Jackson Purchase region. Road building here demands detailed maps.

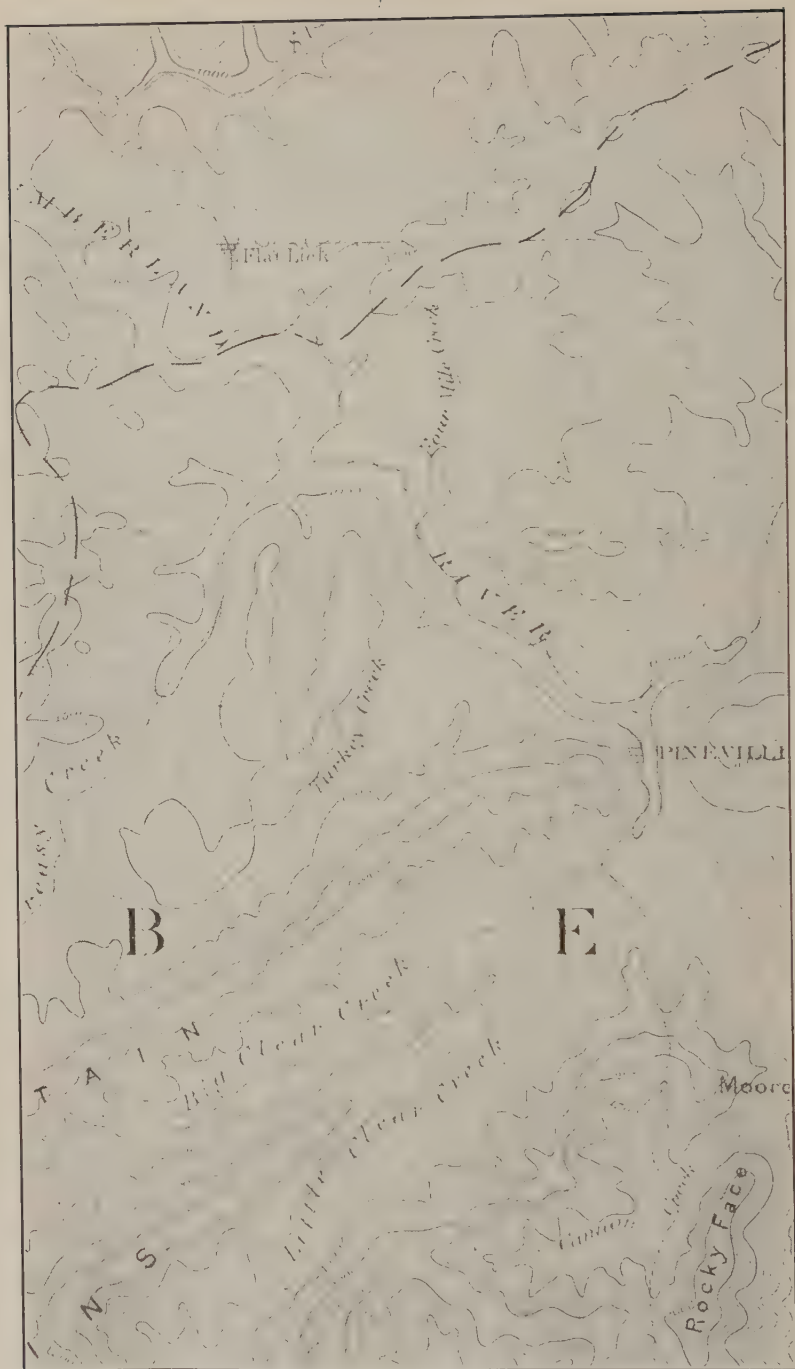




CUMBERLAND FALLS

This important scenic area is shown on the old 1:125,000 scale, Williamsburg Quadrangle. Inaccuracies are very apparent on this old map and the region should be preserved to the scale 1:25,000 or more.



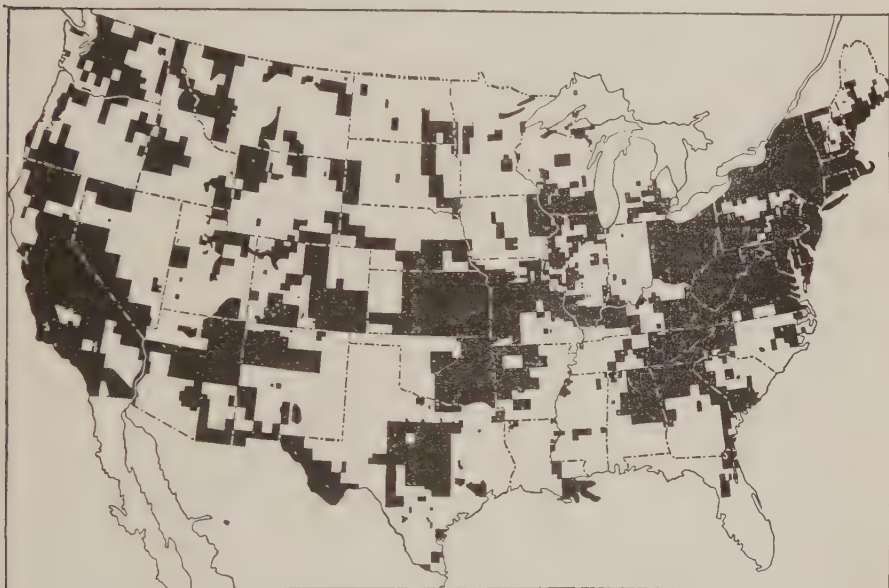


#### TOPOGRAPHY—CUMBERLAND GAP SHEET

This quadrangle was surveyed during the period 1882-86 by the U. S. Geological Survey to the scale 1:125,000. Recent development is now shown at all. This important mineral area should be resurveyed immediately scale 1:62,500 as the present map is much out of date and too generalized for detailed use.



the areas to be surveyed, in order that those having the greatest economic importance and interest may be first in their completion. The field work will be executed with every dispatch, and the maps inked in and engraved by the U. S. Geological Survey

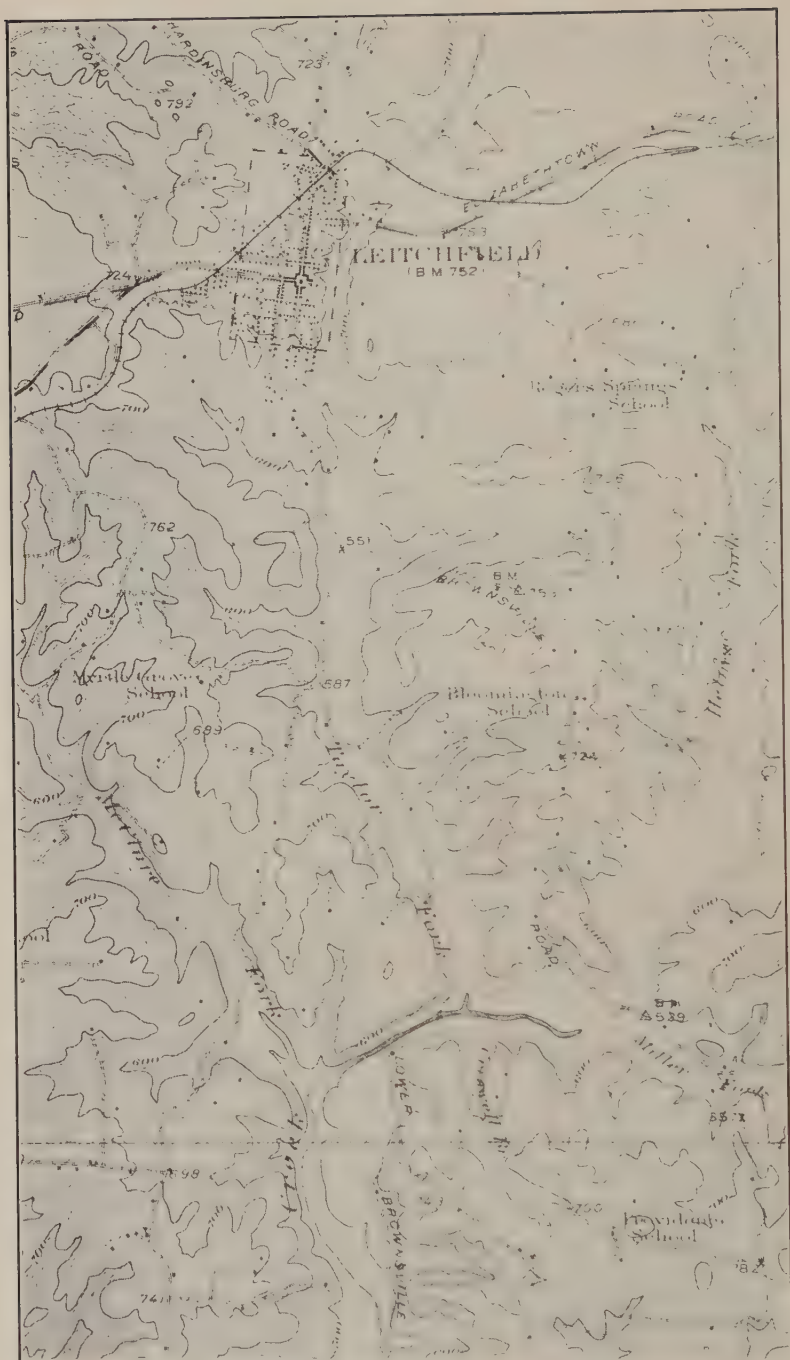


Extent of Topographic Mapping in U. S. 1925.  
The Northeastern States and Kansas are almost completed mapped.

as soon thereafter as possible. In this connection it is important to call attention to the fact that no charge is made by the U. S. Geological Survey against the \$400,000 for the engraving of these maps. Hence none of the funds coming from Kentucky will be used for printing. This work is done without cost to the State by the best and most modern methods in Washington, D. C.

Could \$400,000 divided into four annual installments of \$100,000, beginning January 1, 1926, be made available for this important work, it may be said with confidence that this State could be completely topographically mapped by January 1, 1930. With this work executed Kentucky would take its place beside the several other alert and progressive states in the Union who have executed their complete base maps. The States, now completely or more than 95 percent topographically surveyed, include Ohio, West Virginia, Pennsylvania, New York, Rhode Island,





### THE NEW LEITCHFIELD QUADRANGLE

This new map covers a portion of the Rock Asphalt field of Western Kentucky. Scale 1:62,500. Northern part is here shown.

New Jersey, Delaware, Connecticut and Massachusetts. The States thus indicated comprise the industrial heart of America. As soon as Kentucky completes her base map and joins the list of progressive States, her opportunities for rapid mineral resource advancement are assured.

At the present time no adequate moneys are specifically appropriated under a special act of topographic mapping in Kentucky, and unless adequate funds are made available, it will be a generation or longer before this State will enjoy a complete and accurate base map. In the meantime the advancement of the industrial and mineral development of Kentucky will be retarded and this State unable to avoid such retardation will pay a much greater indirect tax and suffer a much greater loss than any one can accurately figure. The sum of \$400,000 is ridiculously small compared to the amount of money which will be lost annually in unattained prosperity and development because of the lack of adequate base maps for this State during the next thirty to fifty years.

If these much needed base maps are prepared they will pay for themselves in an accelerated prosperity which will be state-wide, and it may be pointed out here with every assurance that at the present time the greatest localized benefits which will result in the completion of the topographic base map will be in those areas which have for many years been designated as "pauper counties." The completion of an accurate base map for these extended backward sections will assist in "putting them on their feet" and thus relieve the agricultural counties of Central, Southern, and Western Kentucky from a great, and according to the present plan, an unending burden.

Mineral development bringing the investment of large wealth, new pay rolls, and relief will in the course of a short time result in lower taxation for State purposes. The tremendous amount of moneys which will thus be saved taxpayers will stimulate new and progressive industry in Kentucky. In this sound and continuous way the original cost of these maps, and any and all interest which may accrue will be many times over repaid to the people of the Commonwealth. The beauty of the proposal is that once the maps are prepared there will be no further cost attached to them. The mapping of Kentucky is in



A NEW INTERSTATE MAP

This is a portion of the new Regina quadrangle and lies partly in Southeastern Kentucky and partly in Southwestern Virginia at the "Breaks" of the Big Sandy River. It is surveyed to the scale of 1:62,500 and shows 50-foot contour intervals.

a way similar to the taking of an inventory of a stock of merchandise. No merchant could expect to attain success in any line if he did not know all that his stock contained. Kentucky cannot hope to offer as great a prosperity to her citizens, as her sister states do, so long as one half of her resources remain unmapped and unknown. Buried talents pay no dividends!





**PUBLICATIONS OF THE SIXTH, KENTUCKY GEOLOGICAL SURVEY.**

These geological reports cover the range of Kentucky's mineral resources, and also present divisions of its stratigraphy and structure. Totalling thirteen separate and distinct volumes, they comprise all of the bound works of the Kentucky Geological Survey from April 1, 1926, to date. Twelve additional manuscripts of very great economic value besides a large number of county maps have been prepared by the Survey and are now ready for the printer, but no funds are available for their publication.



## XII.

### *Administrative Report*

*For The (Sixth)*

### KENTUCKY GEOLOGICAL SURVEY

*Years 1922 and 1923*

By

WILLARD ROUSE JILLSON

*Director and State Geologist*

#### GOVERNING STATUTE

The act creating and governing the (Sixth) Kentucky Geological Survey and making appropriations for same is entitled as follows:

“An Act creating the Kentucky Geological Survey, designating its chief executive officer and his duties, and providing funds for its maintenance.”<sup>1</sup>

This act, in conjunction with the Budget Bill of 1922, provided a total of \$40,500.00 for the maintenance of the prescribed activities of the the Kentucky Geological Survey. This appropriation is divided into two funds: (1) Co-operative topographic mapping fund of \$17,500.00, and (2) General Geological Fund of \$23,000.00. In accordance with the statute the first fund has been used in a “dollar for dollar” co-operation with the U. S. Geological Survey in an extension of the topographical base map of Kentucky. The second fund has been used for the maintenance of the Kentucky Geological Survey proper, payment of salaries, field expense, and miscellaneous charges, including printing.

#### PERSONNEL OF THE SURVEY

The personnel of geological assistants<sup>1</sup> and trained office workers employed on the (Sixth) Kentucky Geological Survey

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<sup>1</sup> Acts of the General Assembly of the Commonwealth of Kentucky Chapter 34, p. 141. 1920.



during the past biennium is given below. Most of these assistants are classified as "temporary employees" having been engaged for the summer field season of two or three months to do a special piece of geological or mineral resource investigation:

#### DIRECTOR AND STATE GEOLOGIST

WILLARD ROUSE JILLSON, B. S., M. S., Sc.D., D. Sc., Frankfort, Kentucky.\*

#### ASSISTANT GEOLOGISTS

CHARLES HENRY RICHARDSON, Ph. D., Head of the Department of Geology, Syracuse University, Syracuse, New York.

STUART WELLER, Ph. D., Head of the Department of Paleontology, University of Chicago, Chicago, Illinois.

LEONIDAS CHAMBERS GLENN, Ph. D., Head of the Department of Geology, Vanderbilt University, Nashville, Tennessee.

HEINRICH RIES, Ph. D., Head of the Department of Geology, Cornell University, Ithaca, New York.

ARTHUR MCQUISTON MILLER, M. A., Head of the Department of Geology, University of Kentucky, Lexington, Kentucky.

WALTER H. BUCHER, Ph.D., Acting Head of the Department of Geology, University of Cincinnati, Ohio.

CHARLES BUTTS, M. S., Geologist, U. S. Geological Survey, Washington, D. C.

WALTER GREELEY BURROUGHS, M. S., Head of the Department of Geology, Berea College, Berea, Kentucky.

LOUIS W. CURRIER, M. S., Associate Professor of Mineralogy, Syracuse University, Syracuse, New York.

JAMES S. HUDNALL, B. S., Bowling Green, Kentucky.

#### GEOLOGIC AIDES

BENJAMIN B. COX, B. S., Chicago, Illinois.

GEORGE W. MORRIS, A. B., University of Cincinnati, Cincinnati, Ohio.

CHARLES VERNON THIES, C. E., University of Cincinnati, Cincinnati, Ohio.

SAMUEL M. MAYFIELD, B. S., Berea College, Berea, Kentucky.

#### GEOGRAPHERS

DARRELL HAUG DAVIS, Ph. D., Head of the Department of Geography, University of Minnesota, Minneapolis, Minn.

K. C. McMURRAY, Ph.D., Department of Geography, University of Michigan, Ann Arbor, Michigan.

JOHN B. LEIGHLY, A. B., University of California, Berkeley, California.

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\* During the past biennium there were only three regular or full time employees on the Kentucky Geological Survey. These have been indicated by an asterisk. All other employees are temporary, periods ranging from 3 weeks to 3 months.

CLARENCE W. NEWMAN, A. B., Department of Geology, University of Colorado, Boulder, Colorado.

CARL O. SAUER, Ph.D., Head of the Department of Geography, University of California, Berkeley, California.

#### VARIOUS

W. D. FUNKHOUSER, Ph.D., Head of the Department of Zoology, University of Kentucky, Lexington, Kentucky, Zoologist.

ADOLPH CARL NOE, Ph.D., Associate Professor of Botany, University of Chicago, Chicago, Illinois, Paleobotanist.

REINHARDT THIESSEN, Ph.D., U. S. Bureau of Mines, Pittsburg, Pa., Paleobotanist.

CHARLES STEVENS CROUSE, M. S., Professor of Metallurgy, University of Kentucky, Lexington, Kentucky., Oil Shale Technologist.

A. M. PETER, Sc.D., Head of the Department of Chemistry, Agricultural Experiment Station, University of Kentucky, Lexington, Kentucky, Chemist.

WARREN R. KING, C. E., U. S. Geological Survey, Division Water Resources, Chattanooga, Tennessee., Water Resource Engineer.

JOSEPH L. BISSELL, Frankfort, Kentucky, Draftsman.

F. W. BERTSCH, A. B., University of Cincinnati, Cincinnati, Ohio, Draftsman.

LAFAYETTE B. HERRING, A. B., Lexington, Kentucky, Statistician.

J. FORREST CUSICK, Frankfort, Kentucky, Photographer.

HUBERT DIXON CRIDER, University of Kentucky, Lexington, Kentucky, Engineer.

GEORGE W. PIRTLE, University of Kentucky, Lexington, Ky., Engineer.

J. M. FRASURE, Frankfort, Kentucky, Chief Clerk.\*

ANN M. CRITTENDEN, Frankfort, Kentucky, Manuscript Copyist.

CATHERINE B. McNAMARA, Frankfort, Kentucky, Stenographer and Accountant.\*

#### SUMMARY OF ACTIVITIES

The field work of the Kentucky Geological Survey for the years 1922 and 1923 consisted of a number of detailed, and general geological and mineral resource investigations widely distributed throughout Kentucky. During this period the quadrangular work of Dr. Stuart Weller in Livingston, Caldwell and Crittenden counties on the structure and stratigraphy of the Mississippian rocks of this region has been continued. This section forms the northern portion of the well known western Kentucky fluorspar field. The reports which have been published on this section are as follows: Vol. 4, "The Geology of the Golconda Quadrangle," and Vol. 10, "The Geology of the Prince-

ton Quadrangle." The "Geology of the Cave-In-Rock (Marion) Quadrangle has been executed in the field and the manuscript and map has been prepared, but the report has not been published.

During the past two years Dr. Charles H. Richardson has been engaged in quarry studies which have resulted in the publication of Vol. 11, "The Building Stones of Kentucky." In this report are described 616 Kentucky quarries. Twenty-three new marbles rather widely distributed throughout the State are also indicated. This work is now available for public distribution. Dr. Richardson has also completed his work (Vol. 22) on the "Road Materials of Kentucky," which was done in co-operation with the State Department of Roads and Highways and the Kentucky Geological Survey. The field work and expense was met by the Road Department, while the geological work was directed through the Kentucky Geological Survey, which organization will also publish the report which is now in the hands of the printer.

A reconnaissance report (Vol. 13) on the "Fluorspar Deposits of Kentucky" has been completed by Prof. L. W. Currier and published by the Geological Survey. This treats of the occurrence of fluorspar in central and western Kentucky, but is not a detailed report as topographic base maps were not available for these sections when this work was executed.

Dr. D. H. Davis has completed a regional geographic study of the Jackson Purchase which has been published. This report (Vol. 9, "Geography of the Jackson Purchase") has had a wide distribution and met with popular approval. It brings out the fundamental economic relationship between the geography, physiography and geology of the region discussed. The State Geologist, Dr. W. R. Jillson, has prepared a report, Vol. 12, entitled "New Oil Pools of Kentucky." This bulletin describes the occurrence of recently mapped anticlines and domes at a number of points in Kentucky where oil and gas is now indexed, and indicates points where further prospecting may be expected to increase this production. He has also prepared a report (Vol. 15) entitled "Geological Research in Kentucky," which is a summary consideration of all the geology that has been published by the Kentucky Geological Survey, the U. S. Geological Survey,

and various technical societies relative to the geology of Kentucky. This report will soon be available and will do much toward making the older reports, many of which are now only to be found in libraries, of service to the public.

Warren R. King has prepared a report (Vol. 14) on the "Surface Waters of Kentucky," which gives volume and flow readings. This report is calculated to be of great benefit in assisting in the interpretation of the value of undeveloped hydroelectric power in Kentucky. It takes up all the major drainage courses of the State. This report is now in the hands of the printer.

Dr. William D. Funkhouser has prepared a report (Vol. 16) on a part of the zoology of Kentucky which will be of much benefit to the people of the State, particularly students. It deals systematically with the "Wild Life of Kentucky."

Prof. Arthur M. Miller has been engaged in mapping in detail the geology of Woodford, Jessamine and Fayette counties, and has completed the work in Woodford County. This report is now in the hands of the printer. The work on the other two counties is still in progress.

Prof. Wilbur G. Burroughs has executed two timely reports, one (Vol. 19) on the "Geography of the Knobs of Kentucky," and another (Vol. 24) on the "Geography of the Western Kentucky Coal Field." Both of these reports are in the hands of the printer.

Dr. Walter H. Bucher has completed his detailed studies of the Jeptha Knob of Shelby county, which exhibit very interesting and unusual structural conclusions.

Dr. D. H. Davis has extended his geographic studies and has executed (Vol. 18) the "Geography of the Mountains of Kentucky." This report is now in the hands of the printer. During the past summer he has completed the field work for a report (Vol. 23) on the "Geography of the Blue Grass Region." The manuscript for this report has been completed and is ready for the printer.

Dr. Carl O. Sauer, with a corps of assistants, including Professors McMurry, Leighley and Newman, has been engaged during the past season in executing the field work on a report (Vol. 25) on the "Geography of the Mississippian Plateau in Ken-

tucky." This report is now in preparation. It completes the Survey's series of six regional geographic studies in Kentucky.

A group of papers on the Oil Shales of Kentucky have been prepared by Professor Charles Stevens Crouse, Dr. Rheinhardt Thiessen, and Dr. David White. These papers are now in the hands of the printer and will be published in the near future. They add much to our technical knowledge of the Ohio (Chattanooga) oil shale in Kentucky.

The State Geologist, Dr. W. R. Jillson, has prepared a report (Vol. 20) on the "Coal Industry in Kentucky," which takes up the history of the industry, its present distribution, and its productivity. Besides a general discussion of the geology of the coals of Kentucky, this report gives for the first time a list of all the commercially important coal mines in the State.

The name of the coal that each of these 750 mines is operating is also given in this report. Dr. Jillson has also prepared a new (Jan. 1, 1923) general geological map of the State of Kentucky which is greatly improved over all previous editions. The fault pattern in so far as it is now definitely known in Kentucky is indicated on this map, as is the Eastern Kentucky Geosyncline. All of the oil and gas pools are indicated, together with their pipe line connections, and each of the 750 coal mines now operating in the State is located as accurately as the scale will permit. Value and volume figures for coal, oil and fluorspar from 1914 to 1922 are given on this map.

Separate from the colored geological map, the Survey has prepared and published a new edition of the base map of the State of Kentucky, scale 1 inch equals 10 miles. This map is printed in two colors, black and blue, the blue being used to designate the streams. The background of the new map is white, which will make it useful for teachers, students and others.

In the course of investigations carried on during the past two years all of the counties in Kentucky have been covered in one or more respects. Most of the counties appear in all of the reports either directly or indirectly. Detailed geological investigations, however, have necessarily had to be confined to areas which had been previously topographically base mapped, as no other accurate base map exists on which accurate elevations are to be found.



The Kentucky Geological Survey under the personal direction of the State Geologist has prepared a series of eighteen (18) new reconnaissance black and white geographical county maps, most of them for counties which have never before been mapped. The scale in most instances is 1 inch equals 1 mile. These maps are road and stream maps and do not carry elevations, and are not suitable for detailed geological work, but are suitable for, and much in demand by tourists, farmers, road engineers, sanitary engineers, contractors and many others. Counties so mapped were: Boone, Kenton, Campbell, Bracken, Pendleton, Harrison, Grant, Anderson, Gallatin, Carroll, Owen, Franklin, Livingston, Lyon, Scott and Bourbon. The maps of Franklin and Anderson are now in the hands of the printer. Three (3) new oil and gas maps have been prepared for Cumberland, Monroe and Metcalfe counties in southern Kentucky, scale 1 inch equals 1 mile. These counties had never been previously surveyed. The detailed geology for Webster County and Woodford County has also been done, the first by Dr. Glenn and the second by Professor Miller. The Webster County map has been published and is available for distribution; the Woodford County map, however, is still in the hands of the draftsman as is a new map of McLean County.

The detailed oil and gas structural geology has been prepared by county units for six (6) eastern Kentucky counties during the past several years. These counties are: Floyd, Martin, Pike, Perry, Leslie and Boyd. Field work is now in progress in Lawrence County, which will complete the Big Sandy Valley. This work has been executed by James S. Hudnall, under the personal direction of the State Geologist. The Perry, Leslie and Boyd County maps are now in the hands of the printer. All of these maps are scaled 1 inch to the mile, and are much in demand. The completion of the Lawrence County map in the near future will give twenty-eight new county maps for the public use. These have all been prepared during the last two years by the survey.

### TOPOGRAPHIC BASE MAPPING

During the years 1922 and 1923 co-operative topographic base mapping executed by the Kentucky Geological Survey and



the U. S. Geological Survey in a "dollar for dollar" co-operation has been extended, and \$17,500.00 as appropriated by the legislature, has been devoted to this purpose by Kentucky. The Director of the Kentucky Geological Survey has designated the areas to be mapped, and the Director of the U. S. Geological Survey has supplied the men and the instruments, the maps being prepared and engraved by the U. S. Geological Survey. As a result of this co-operative agreement the following sheets have been completed: (1) Bowling Green, (2) Brownsville, (3) Frankfort and (4) Mammoth Cave. Field work has been extended to complete the Cub Run, Leitchfield and Horse Branch sheets. The Scottsville and the Mt. Eden topographic sheets are 50% and 75% completed, respectively.

At the present time, of the 40,598 square miles in Kentucky 19,898 square miles are base mapped topographically, and 20,705 square miles remain to be mapped. It is very urgent that this unmapped area be base mapped as soon as possible, as this unmapped area is responsible for holding back the development of a large part of the mineral resources of Kentucky. The States which have completed their topographic base maps are: Ohio, West Virginia, Maryland, Delaware, New Jersey, New York, Connecticut, Rhode Island and Massachusetts. Pennsylvania is about 95% base mapped, and Virginia about 80% base mapped. Kentucky will continue to trail behind her sister states in the development of her mineral resources until this State like other advanced and progressive states of the Appalachian district is entirely topographically base mapped. In its annual session at New Orleans, December 3-6, 1923, the American Association of State Highway officials recommended by detailed resolution which has been forwarded to your office the rapid completion of the Topographic base map. This mapping has also been recommended by the Kentucky Department of State Roads and Highways in their last official report to your excellency and the Legislature. It is of prime importance to the development of Kentucky.

#### OFFICE WORK

The office work of the Kentucky Geological Survey has been carried on during the past biennium by three regular or full-time

employees, including the State Geologist, and has totaled 15,600 letters received, and 14,563 sent out. The average number of letters received per day has been 27, and the average number sent out per day has been 25. A detailed statement by months is given in the following table:

CORRESPONDENCE THROUGH THE U. S. POST OFFICE  
AT FRANKFORT, KY., FOR THE TWO FISCAL YEARS  
JULY 1, 1921 TO JUNE 30, 1923, INCLUSIVE

Year	Month	Letters Received	Letters Sent
1921.....	July .....	586	566
1921.....	August .....	594	662
1921.....	September .....	676	636
1921.....	October .....	750	785
1921.....	November .....	680	616
1921.....	December .....	699	626
1922.....	January .....	640	601
1922.....	February .....	721	673
1922.....	March .....	825	736
1922.....	April .....	522	468
1922.....	May .....	677	562
1922.....	June .....	602	560
Total July 1, 1921 to June 30, 1922, inclusive.....		7,972	7,491
1922.....	July .....	705	542
1922.....	August .....	671	625
1922.....	September .....	566	545
1922.....	October .....	649	589
1922.....	November .....	552	530
1922.....	December .....	612	597
1923.....	January .....	625	596
1923.....	February .....	596	548
1923.....	March .....	759	713
1923.....	April .....	684	622
1923.....	May .....	694	667
1923.....	June .....	515	498
Total July 1, 1922 to June 30, 1923, inclusive .....		7,628	7,072
Grand Total for the two years ending June 30, 1923....		15,600	14,563
Daily Average .....		27	25

The smaller number of letters written and sent out is accounted for by the fact that a considerable portion of the corres-

pondence calls for certain reports and maps and does not require other official reply.

One of the chief activities of the Kentucky Geological Survey is the furnishing of detailed and accurate geological and scientific information concerning the geology, mineral and natural resources of Kentucky. In this State and international service during the past biennial period 17,427 geological reports and maps have been sent from this office in response to written or personal requests accompanied by separate amounts of postage as required by law as shown by the following statement:

### KENTUCKY GEOLOGICAL SURVEY PUBLICATIONS DISTRIBUTED UPON REQUEST

#### FIRST FISCAL YEAR, 1921-1922

Year	Mo. .	Number		Total
		Mailed	Carried Away	
1921—July .....		638	59	747
1921—August .....		632	120	752
1921—September .....		532	60	592
1921—October .....		764	95	859
1921—November .....		488	147	635
1921—December .....		284	86	370
1922—January .....		835	26	861
1922—February .....		823	250	1,073
1922—March .....		905	91	996
1922—April .....		482	75	557
1922—May .....		859	67	926
1922—June .....		563	186	749
Total for Fiscal Year Ending 1921-1922 .....				9,117
1922—July .....		452	67	519
1922—August .....		417	140	557
1922—September .....		495	86	581
1922—October .....		459	167	626
1922—November .....		596	40	636
1922—December .....		697	300	997

Year	Mo.	Number	Carried	Total
		Mailed	Away	
1923—January .....		903	89	992
1923—February .....		398	94	492
1923—March .....		702	174	876
1923—April .....		741	77	818
1923—May .....		454	146	600
1923—June .....		428	188	616
Total for Fiscal Year 1922-1923.....				8,310
Grand total for two Fiscal Years 1921-1922 and 1922-1923 ..				17,427
Daily Average .....				30

The reports and maps distributed as indicated above pertain to every subject relative to the geology, soils and mineral resources of Kentucky. These publications have been sent, not only to every place in Kentucky, but throughout the United States; also Canada, Mexico, England, France, Germany, Japan and China. Requests for publications of the Kentucky Geological Survey through foreign libraries, industrial corporations and institutions is a growing one. The total amount of postage received in this service was re-used directly during the past biennium and has amounted to \$1,876.54. Since this amount of postage thus obtained is in effect a revolving unit being used as quickly as it is taken in, amounts in excess of a few dollars are never maintained in the office of the Survey. Of all the considerable amount of business which has proceeded through the U. S. post office for first-class correspondence and second-class mail or publications, not one penny has been drawn from the treasury of the State of Kentucky. In this respect the Kentucky Geological Survey is entirely self-supporting. The monthly and annual totals of postage received by the Kentucky Geological Survey follows:

## FIRST FISCAL YEAR, 1921-1922

July .....	\$70.68
August .....	49.50
September .....	69.75
October .....	54.30
November .....	51.60
December .....	25.00

January .....	\$49.00	
February .....	85.00	
March .....	53.00	
April .....	59.00	
May .....	78.00	
June .....	123.00	
Total .....	\$767.83	\$767.83

## SECOND FISCAL YEAR, 1922-1923

July .....	\$50.50	
August .....	63.00	
September .....	41.00	
October .....	63.00	
November .....	43.00	
December .....	73.00	
January .....	48.50	
February .....	57.10	
March .....	68.00	
April .....	49.35	
May .....	38.00	
June .....	33.00	
Total .....	\$627.45	627.45

Grand total used in mailing parcel post packages .....	1,395.28
Letters mailed first fiscal year, 7,491, at 2c .....	149.82
Letters mailed second fiscal year, 7,072 2c .....	141.44
Approximate amount of postage used in this office for registered letters and manuscripts during the two years ..	190.00
Total postage used during the two fiscal years, 1921-1922 and 1922-1923.....	\$1,876.54

## NEW PUBLICATIONS

The following publications have been prepared in 1922 and 1923:

Vol. \*7.—Series VI, Mississippian Series in Eastern Kentucky, by Charles Butts. 1922.

Vol. 8.—Clay Deposits of Kentucky, by H. Ries. 1922.

\*Volumes No. 1 to 6 inclusive, were published by the Kentucky Geological Survey during 1920 and 1921, and are listed and discussed in the administrative report for that period.

- Vol. 9.—Geography of the Jackson Purchase, by D. H. Davis. 1923.
- Vol. 10.—Geology of Princeton Quadrangle, by Stuart Weller and others. 1923.
- Vol. 11.—Building Stones of Kentucky, by Chas. H. Richardson. 1923.
- Vol. 12.—New Oil Pools of Kentucky, by W. R. Jillson. 1923. (In press.)
- Vol. 13.—Fluorspar Deposits of Kentucky, by L. W. Currier. 1923.
- Vol. 14.—Surface Waters of Kentucky, by W. R. King. 1923. (In press.)
- Vol. 15.—Geological Research in Kentucky, by W. R. Jillson. 1923.
- Vol. 16.—Wild Life in Kentucky, by W. D. Funkhouser. 1923. (In press.)
- Vol. 17.—Mineral Resources of Kentucky, by W. R. Jillson. 1923. (In press.)
- Vol. 18.—Geography of the Mountains of Kentucky, by D. H. Davis. 1923. (In press.)
- Vol. 19.—Geography of the Kentucky Knobs, by W. G. Burroughs. 1923. (In press.)
- Vol. 20.—Coal Industry in Kentucky, by W. R. Jillson. 1923. (In press.)
- Vol. 21.—Oil Shale of Kentucky, R. Thiessen, D. White and S. C. Crouse. 1924. (In press.)
- Vol. 22.—Road Materials of Kentucky, by Chas. H. Richardson. 1924. (In press.)

#### RECOMMENDATIONS TO THE GOVERNOR AND LEGISLATURE

The general investigations of the Kentucky Geological Survey during the past five years have resulted in an examination of most of the commercially important mineral resources of Kentucky. Where good topographic base maps have been available detailed work has been done in so far as funds would allow it. The reports and maps which have been prepared have been eagerly sought by mineral operators and others as the Kentucky Geological Survey is the only reliable source of information rel-



ative to the mineral resources and small unit maps of this State.

On July 1, 1923, a little more than one-half of the State of Kentucky remained unmapped with a topographic base. This unmapped area comprised 20,706 square miles as computed by the U. S. Geological Survey. The mapped area at this time comprised 19,893 square miles, giving a total of 40,598 square miles, or the total area of Kentucky.

The time has come when, if Kentucky is ever to secure a large development of its mineral and natural resources, detailed geological investigations must take the place of general reconnaissance work. In a list of about 35 minerals which occur in Kentucky, the following 13 are now of paramount economic importance, and should receive detailed consideration: Asphalt, Fluorspar, Fire Clays, Natural Gas, Bituminous Coals, Cement Materials, Barite, Petroleum, Marbles, Mineral Waters, Oil Shale, Molding Sands, Mineral Paints and Ochres. These resources can not be mapped in detail at the present time, or in the future, until topographic base maps (approximately 18x14 miles) are executed for the regions in which they occur. The flint fire clay deposits of northeastern Kentucky in Carter, Rowan, Elliott, Boyd, Greenup, Morgan and Lewis counties are among the best and largest in the United States. The cannel coals of eastern Kentucky, and particularly northeastern Kentucky in Morgan, Johnson, Magoffin, Floyd, Elliott and Rowan counties are the best in the United States, yet they have never been described in detail. These wonderful coals are deserving of careful geological investigation and mapping.

Asphalt occurs in Hart, Edmonson, Warren, Hardin, Grayson, Breckinridge, Hancock, Ohio, Logan, Butler and Muhlenberg counties in western Kentucky, and in Carter, Rowan, Elliott, Johnson and Letcher counties in eastern Kentucky. These deposits of rock asphalt, particularly those of western Kentucky, are far superior quantitatively and qualitatively to any other deposits in the eastern United States. No detailed report on rock asphalt is available, but one should be prepared in order that this great latent body of mineral resource wealth may be developed. Detailed reports are also needed on Bituminous Coals, Fluorspar, Barite, Petroleum, Natural Gas, Marbles, Mineral Waters,

Cement Materials, Oil Shales, Mineral Paints, Molding Sands, etc., of Kentucky.

During the past four years the funds provided for the Kentucky Geological Survey have been inadequate to meet the needs of the Survey and the demands imposed upon it by the general public. Funds have been so low as to make it impossible to maintain an Assistant Geologist of ability on the Survey throughout the year. From year to year an increasingly large amount of manuscript reports and mineral resource maps have remained unprinted due to lack of funds with which to publish them.

The total number of bound printed reports now in stock is 7,318, as compared to 10,612 in stock at the end of the last biennium. Although 5,500 new reports have been added there is a loss of 3,294 for the past two years. At this rate of decrease even with the new reports that will be added, there will be no printed reports for distribution to the general public in a little over four years. The only remedy for this alarming condition is an increase in the size of new editions. This cannot be done with the present small appropriations.

In the spring of 1922 and 1923 insufficient amounts in the geological fund were left in the State Treasury to meet the pay roll of the three regular employees of the Survey. This difficulty was obviated in one case by selling an old automobile, and in another instance by putting the entire geological survey to work for the Tax Commission. Such practices are not only discouraging to the best efforts of the Survey but are a real obstruction to satisfactory service to the State and general public. The Survey cannot longer be maintained and function to advantage on the small general appropriation of \$23,000.00. Many of the reports which are most in demand have been exhausted in edition, and not only is there no money in sight with which to print new editions of these valuable works, but there are no funds to bring out a large number of entirely new manuscripts which are ready for the printer.

The wealth of the State is found in the active development of its agriculture, its mineral resources and its manufacturing. The state which depends to a large extent upon any one of these orders of industry will be much poorer than one which is supported by two or three. Kentucky has long stood back, main-

tained almost entirely by its agriculture. Its mineral resources and industrial development have lagged. Coal, oil and gas have only begun during the last few years to be developed. It is thoroughly possible following a complement of the topographic base mapping of Kentucky and detailed geological investigations to bring out the resources of this State and give them the needed publicity. This will certainly result in the large flow of capital into Kentucky for development.

The production of minerals in this State and the re-use of Kentucky minerals in Kentucky for manufacturing purposes could be made very great. With such development will necessarily come large ad valorem assessments and an increase of tax moneys into both the State and county treasuries. The establishment of many new large pay rolls throughout particularly the "pauper" sections of Kentucky where undeveloped mineral resources are now known to occur will result in increased prosperity for these sections. This new industrialism will result in keeping Kentucky's manhood and womanhood in Kentucky rather than allowing it to drift out of the State from year to year, as it has always done in the past. The population of this State has remained practically stationary when compared with that of other states for several decades. Kentucky's area is nearly the same as that of the state of Ohio. Yet its population according to the last U. S. census is but about one-half of that of our northern sister state. The reason for this sad condition of affairs is found in the lack of interest in mineral resources and industrial development in Kentucky.

To enable the Kentucky Geological Survey to base map the State, detail its resources, and thus advance development, the following appropriations are recommended:

1. Annual appropriation of \$100,000.00 for co-operative topographic base mapping.
2. Annual appropriation of \$50,000.00 for the general purposes of the Kentucky Geological Survey, including geological investigations of resources, office administration, printing, etc.

This total appropriation of \$150,000.00 should be secured through the budget bill. There should also be appropriated through a separate bill in the present legislature an emergency appropriation of \$17,000.00, so that a large number of the re-

source reports and maps which are now in the hands of the printer may be published and paid for forthwith, and thus be made available for the general public. This money will also allow road material investigations which are now much needed and should precede large road construction in Kentucky rather than follow it if the maximum mileage is to be secured at a minimum cost to the Department of State Roads and Highways. This work has been recommended by the Efficiency Commission in its recent report to the Legislature. If such an emergency appropriation is not appropriated, these reports, some of which have been in the hands of the printer for some time, will become old, and to a certain degree out of date before they can be presented to the public.

### AVAILABLE MAPS AND REPORTS

There are now ready and available for immediate distribution through the Kentucky Geological Survey to any interested individual, corporation, company or institution requesting same a large number of special reports and maps, prepared by this and previous Surveys. These publications cover the general geology and development of many of the mineral resources of Kentucky. The early reports of the 1st and 2nd Geological Surveys are now entirely exhausted, with but a few exceptions. The publications of subsequent surveys, including the present or (Sixth) Kentucky Geological Survey, which are now available are listed in chronological sequence by titles and authors. The required postal charge and the number which are still available is indicated. The number of reports now in stock is 7,318. The total number of maps is 25,835. The total of maps and reports now available for distribution is 33,153. A request for any of these publications addressed to the Director, when accompanied by the required amount of postage (checks or money orders may be used) will be promptly filled until the edition is exhausted. The list given is essentially a duplicate of the one used in the official correspondence of the Kentucky Geological Survey.

#### LIST OF AVAILABLE MAPS AND REPORTS

JUNE 1, 1923

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